Mercury Dental Amalgams
– Analyzing the Debate –

by Gary Null

Over the past few decades, Americans have been besieged by a series of health epidemics with one common denominator: all were man-made. With each of these epidemics, the government and its watchdog agencies routinely assured us that a danger did not exist. Since they would not allow harmful foods, chemicals or drugs on the market, the reasoning went, the very fact that the products were in use assured us of their safety.

When overwhelming evidence proved the contrary, government and industry only begrudgingly removed these products from the shelves. The epidemics in question? Diethylstilbesterol, which harmed millions of Americans; Oraflex, the anti-arthritic drug; DDT, the pesticide; and the Dalkon shield, to name just a few of more than 200 such items that got an official stamp of approval over the years.

Now the battle line has been drawn over yet another "safe" substance, the mercury silver amalgam used in dental fillings. On one side of the battle are the scientists, holistic dentists and health activists who believe mercury amalgams are a biological time bomb ticking away in our mouths. They point to scientific evidence showing that chronic mercury exposure from dental fillings puts most people at risk for serious health disorders.

On the other side stands the dental establishment, led by the American Dental Association, which claims that mercury amalgam has adverse effects only on people who are hypersensitive to it. The ADA pegs this group at 1% of the population. For the rest of us, it says, amalgams pose absolutely no harm.

But the ADA has yet to offer scientific proof of mercury's safety, leading health advocates to call for a ban on its use. The Toxic Element Research Foundation (TERF) claims that the cumulative effects of mercury amalgam poisoning make it one of the most insidious health hazards facing Americans today.

"The true impact of amalgam poisoning is similar to that of the Chernobyl tragedy," states the organization. "The magnitude of the crisis is not the few who have died from massive exposure, but rather it is the millions whose health will be eroded by the ongoing, small-dose poisoning."[1]

Considering that 19 out of 20 Americans suffer from dental cavities, the stakes are indeed high. More than 200 million people - some 85% of the population - already have at least one cavity filled with mercury amalgam.[2] Little wonder, then, that Americans are demanding a much more persuasive answer to the fundamental question: Are mercury amalgams safe?

A History of Ill Effects

Mercury has a long history of extreme toxicity, which makes its deliberate use in people's mouths all the harder to comprehend. Consider the bare facts: One of the oldest of all recognized poisons - a metal more toxic than lead and even arsenic - is the main ingredient in today's most common dental amalgam, which American dentists place in about 1 million fillings per day.[3,4] Disinfectants, antiseptics, pesticides and insecticides contain this same ingredient because it is hostile to life.[5]

Tales of mercury's damaging effects date to ancient Roman and Spanish history, when imprisoned slaves who worked in mercury mines suffered from acute symptoms of fatigue, dyspnea and epigastric pain on their first day. As time passed, they developed other highly common symptoms of mercury poisoning. These included lesions of the nervous system such as erethismus mercurialis (moodiness and other mental disturbances) and tremor mercurialis (involuntary, choreatic shaking movements).

These slaves were condemned to death in the mines, and they eventually wasted away in the terminal stages of mercury poisoning. By contrast, the small doses of mercury released by dental amalgam cause a chronic mercury poisoning that manifests, for the most part, as mental symptoms. That makes it especially difficult to diagnose.[6]

A more recent example of mercury's dangers comes from the British hat-making industry of the late 19th century. At the time, the expression "mad as a hatter" characterized workers who used mercury compounds in the shaping of felt hats. The workers exhibited unusual shyness, mood swings and a dwindling intellect, all symptoms of severe mental retardation.[7] But these dangers were recognized for three-quarters of a century before the use of mercury in the U.S. hat-making industry was banned in 1941.[8]

Mercury got its start in the dental industry in 1826, when a Paris dentist combined it with silver, copper and other metals to create a paste. Seven years later, two brothers in New York City with no dental training began to promote mercury as a cheap alternative to gold fillings.[9] By the end of the 1830s, mercury amalgam's use was commonplace in the U.S.[10] Not only was the material cheap and durable, but it also required less time and skill to place than the trickier gold fillings.[11,12]

Still, traditional dentists were appalled by the very idea of using a known poison in the body.[13] In the 1940s, the American Society of Dental Surgeons required its members to sign a pledge not to use the substance in their practices. But many members refused to sign because they believed mercury's low cost would benefit the poor. The debate caused such a schism in dentistry that the Society eventually folded.

When the American Dental Association formed in 1859, it took a very different stance on the mercury issue. The ADA defended the use of mercury amalgam, helping to establish it as a popular dental filling by the end of the 1800s.[14] The organization's staunch defense of mercury continues to this day.

The Dangers of Mercury

Increasingly, however, the ADA's pro-mercury position flies in the face of scientific evidence proving amalgam's dangers. As far back as 1980, the World Health Organization identified elemental mercury vapor (the form leached by amalgam) as one of the two most hazardous types of mercury to human health.[15] And research has shown that chronic exposure to small amounts of mercury can lead to a long list of ailments,

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affecting everything from the nervous and immune systems to brain and kidney functioning.

The symptoms linked to habitual mercury exposure include the following: anemia, anorexia, colitis, depression, dizziness, drowsiness, headaches, hormonal disturbances, hypertension, impaired coordination, impaired hearing/vision, insomnia, intestinal problems, irritability, joint pains, kidney damage, memory impairment, metallic taste, numbness, peripheral neuritis, psychoses, tremors and weakness.[16,17]

One recent study of 1,320 mercury-toxic patients shows just how prevalent these symptoms can be: 73% suffered from chronic irritability; 72% had chronic depression, with about one-third of these demonstrating suicidal tendencies; and 67% had numbness and tingling in the hands and feet.[18]

Even small amounts of the potent mercury can trigger adverse effects. At exposure levels of only 10 to 30 micrograms per day, researchers have reported changes in body functions such as thyroid uptake, liver function, heart EKG, adrenal gland activity and immunologic responses. One study noted changes in conditioned reflexes at mercury concentrations as low as 2 to 5 micrograms per day.[19] Meanwhile, a newly placed, multi-surface filling in a molar can contain 750 to 1,000 milligrams of mercury.[20]

In essence, mercury is one of multiple stressors that can build up in the body and contribute to disease, says Dr. Robert Rowen, a member of the Academy of Environmental Medicine and the American College for the Advancement of Medicine. Along with malnutrition, allergens, electromagnetic fields and environmental pollutants, mercury will take its toll on the body systems.[21]

But despite the severity of its effects, mercury toxicity can be extremely difficult to diagnose with a simple blood test. The mercury leaches into the bloodstream in very small amounts, but it only stays there for a short time before depositing in the body tissues, says Dr. Sandra Denton, a board member of the International Academy of Oral Medicine and Toxicology. "Instead of looking at the symptoms of mercury (poisoning), the doctors are looking for the mercury and therefore are missing the diagnosis," she says.[22]

In addition, the symptoms themselves can be so diverse that a diagnosis of mercury poisoning remains quite difficult, says Dr. Hal Huggins, a dentist in Colorado Springs, Colorado and the director of the Huggins Diagnostic Center. The lack of an easy and accurate diagnosis lulls the public into underestimating the dangers of mercury amalgams.

"If we knew that (mercury) went to the same place every time, it would be easy to get a verdict against it," says Huggins. "But in one person (it can cause) mental problems, another person may have neurological problems and another may have problems with the heart beating fast. There are so many things that can happen, that it's very difficult to tell what is the diagnosis of mercury toxicity."[23]

The Evidence Against Mercury

Still, the scientific research proving mercury's toxicity has been piling up for years. And while a diagnosis itself may be elusive, the realities of mercury poisoning are hard to ignore when study after study shows that the mercury released from dental amalgams can wreak havoc on the body.

What follows is a description of various studies and reports that have explored the link between mercury amalgams and health disorders. As a body of work, these reports offer a comprehensive view of mercury's ability to enter the body and cause serious damage to physical and mental functioning:

The mechanism of mercury leaching. According to organized dentistry, amalgams do not pose a long-term threat because the mercury becomes inert after a filling has set for several days. But a number of studies prove that mercury continues to leach from fillings due to the ongoing deterioration of the amalgam.

A variety of factors contribute to the corrosion of fillings, including the physical stress of chewing, the acidity and temperature of foods and beverages and the electromagnetic potential of other metals in the mouth. Dental amalgam contains not only mercury (52% by weight), but also silver, tin, copper and zinc. Crowns and bridges may contain these elements as well as aluminum, beryllium, gold, iridium and nickel.[24] Even the simple act of brushing your teeth can release mercury from amalgam, according to a 1985 report by J.E. Patterson.[25]

In a 1983 study, Hakon Hero and other researchers at the Scandinavian Institute of Dental Materials stated: "Amalgam restorations tend to deteriorate at their margins after some time in service. The mechanism by which the degradation takes place is not fully understood. However, both electrochemical corrosion and particle release must be expected to occur."[26]

Indeed, microgram amounts of mercury leach from fillings daily. Researchers generally agree that each surface of a dental filling (an amalgam can consist of several layers) leaches one microgram of mercury per day.[27]

Consider the results of *in vitro* experiments that measured mercury leakage: When amalgam pieces weighing one gram were sealed in a glass tube for less than a month, they gave off up to 30 milligrams of mercury in total. That's about 1 milligram (1,000 micrograms) of mercury per day.[28]

To follow through on the logic, consider that an amalgam has an initial weight of about one gram, and that mercury comprises about half of that weight, or 500,000 micrograms. If the amalgam corrodes by 50% over its 10-year life, then half of the mercury it initially contains - or 250,000 micrograms - has vanished.[29] And many studies have shown that the mercury content of some five- to 10-year-old fillings is indeed reduced to only 25 to 35%.[30]

Mercury vapor in expired air. Other studies have analyzed the expired air of humans to determine how much mercury leaches from amalgams. In a 1985 study by Drs. Vimy and Lorscheider of the University of Calgary (Canada), 35 subjects with amalgams chewed gum for 10 minutes and released "quite substantial" amounts of mercury vapor into intra-oral air, about six times more vapor during chewing than before. Meanwhile, the intra-oral air of control subjects contained insignificant levels of mercury vapor, and the act of chewing did not alter those levels.

The researchers concluded: "The results demonstrate that the amount of elemental mercury released from dental amalgam exceeds or comprises a major percentage of internationally accepted threshold limit values for environmental mercury exposure. It is concluded that dental amalgam mercury makes a major contribution to total daily dosage."[31]

This study confirmed the findings of a similar experiment conducted in 1981 by C.W. Svare at the University of Iowa College of Dentistry and Environmental Chemistry. When researchers analyzed the mercury content in the expired air of

40 people with amalgams and eight without fillings, those with amalgams released 15.6 times more mercury vapor after chewing, while the expired air of the other subjects remained unchanged.[32]

The route of mercury vapor. Once an amalgam releases mercury vapor, the inhaled fumes can travel throughout the body and into the brain. The mercury fumes also settle on the mucous membrane of the nasal cavity, an especially dangerous location since the mercury is then transported directly to the pituitary gland and, again, the brain.[33]

A study released in 1989 followed the route of mercury vapor in the bodies of five pregnant sheep. Dr. Vimy, a consultant to the World Health Organization, placed amalgams in the sheeps' molars during the middle of their pregnancy. The researchers then used a radioactive isotope to isolate the amalgam mercury from other sources and trace its course. They noted the following effects after the amalgam placement:

Day 3: Mercury build-up was evident in the maternal and fetal blood, the amniotic fluid and the maternal urine and feces.

Day 16: Maternal mercury levels were highest in the kidneys, liver, gastrointestinal tract and thyroid. Fetal levels peaked in the pituitary gland, liver, kidneys and placental cotyledon.

Day 33: Most fetal tissues of the newborn sheep had higher mercury levels than did the maternal tissues, specifically in the liver, epiphysial bone, bone marrow, bile, blood and brain.

Day 73: Mercury levels in the mothers' tissues continued to rise in the kidneys, liver, parotid glands, lungs, pancreas, gastrointestinal tract, adrenal glands, pituitary gland, urine, bile, brain and thyroid gland.

Based on these results, the researchers concluded not only that the mercury released from fillings accumulates in maternal and fetal tissues, but also that "dental amalgam is most probably the major source of chronic mercury exposure in humans."[34]

The formation of methylmercury. Common organisms of the mouth and intestines can convert elemental mercury into methylmercury, an organic form of the metal that attacks the nervous and immune systems, the intestinal functioning and the allergy-triggering mechanism.[35,36] Methylmercury can be particularly devastating: It is absorbed through the intestinal wall 45 times more rapidly than mercury and is retained in the body longer.[37]

Methylmercury is 1,000 times more potent in causing genetic damage than colchicine, the next most powerful agent known, according to Swedish professor Claes Ramel. In experiments with fruit flies and onion root cells, extremely low doses of methylmercury - 0.1 ppm or less - inhibited mitosis and caused chromosome breakage. Sublethal doses also decreased the fertility rate in mice, and increased the rates of litter resorption and stillborn fetuses in pregnant mice.[38]

The effects of methylmercury. Methylmercury can cause harm to every part of the body. It leads to bleeding and bone loss, a loss of muscle coordination, impaired vision and sense of smell, and kidney and glandular dysfunction. It is 100 times more toxic to the nervous system than is elemental mercury.[39]

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Methylmercury can permanently damage the brain and nervous system, in fact. Following a large exposure, high levels of methylmercury can lodge in the brain for 10 years or more.[40] Unlike elemental mercury, which touches the outside of a cell and hinders its ability to interact with others, methylmercury actually penetrates the cell. That means it can disrupt the cell's metabolism, break its DNA and, with the addition of a few more mercury molecules, kill the cell.[41]

Methylmercury even passes the bloodbrain and placental barriers, says Dr. Huggins. "There is virtually no barrier in the body to methylmercury. It can go to every cell in the body."[42] When it passes the placental barrier, it accumulates in the fetal brain and blood, thereby increasing the fetus's level of red blood cells to 30% above that of the mother.[43]

Indeed, pregnant women who show no signs of mercury poisoning can give birth to a child with neurological disorders caused by either mercury or methylmercury.[44] The effects of mercury exposure on children include: extensive changes to the brain that affect the entire cortex, including the frontal lobe; a 26% to 55% reduction in brain weight; and a heavy loss of neurons. In cases where the neuron loss exceeded 50%, decortication syndrome developed.[45]

Mercury's accumulation in the brain. The link between dental amalgams and the presence of mercury in brain tissue was established in a 1987 study conducted by Dr. David Eggleston of California in conjunction with Dr. Magnus Nylander of Sweden. The study found a direct correlation between the number of occlusal molars and the amount of mercury accumulated in the brains of 83 cadavers.[46] The subjects with five or more amalgams had an average of three times more mercury in the brain than those with no amalgams.[47] Likewise, autopsies performed at the Karolinska Institute in Sweden, whose board of governors selects the recipient of the Nobel Prize for Medicine, found that people with amalgams had three times more mercury in the brain and nine times more in the kidneys than those with no amalgams.[48]

One of the nation's leading toxicologists, Dr. Louis Chang, also has found a direct connection between dental amalgams and mercury concentrations in the brain. "Mercury levels tend to be higher in those people that have the amalgams, and mercury levels increase as the number of amalgams increases," reports Chang, director of interdisciplinary toxicology and experimental pathology and a professor of pathology, pharmacology and toxicology at the University of Arkansas.[49]

The link with neurological disorders. Occupational and environmental exposure to mercury is known to cause neurological disorders, including syndromes that mimic multiple sclerosis and amyotropic lateral sclerosis, says Dr. Douglas Swartzendruber, chairman of the department of biology at the University of Colorado at Colorado Springs. As a result, it's reasonable to consider that the mercury from amalgam may have a similar effect.

"Much of the controversy concerning mercury is the possible relationship between mercury released from dental amalgams and multiple sclerosis," states Dr. Swartzendruber. While the controversy has not yet been addressed by a controlled clinical trial, he says, several studies provide evidence of a causal relationship. In one such study, he explains, researcher E. Baasch demonstrated in great detail that "facts concerning the geographical and age distribution, pathological development and symptomatology of multiple sclerosis are all consistent with amalgams as the primary cause of the disease."[50]

The effects on immune functioning. Not everyone who has dental amalgams will develop highly visible reactions that demand medical attention. But even in cases where no easily identifiable disease occurs, mercury will diminish the effectiveness of the immune system. As the accumulation of mercury depletes a person's ability to resist the slightest challenge, the patient reaches a "threshold" point at which he or she succumbs to an illness or disease that appears to be a minor final "cause."[51]

Mercury is considered to be a strong immune depressant because it alters the number of T-cells. The cells decrease in number when amalgams are placed in the mouth and increase when the fillings are removed.[52] The other metals contained in amalgam can affect the immune system as well. One recent study found the following immune reactions in 1,000 subjects: 90% to mercury; 87% to copper; 83% to zinc; 56% to tin; and 45% to silver.[53]

In his study of mercury amalgam's effect on immunomodulatory reactions, Dr. Swartzendruber of the University of Colorado found that intra-oral heavy metals altered the quantity and quality of lymphocyte subset distributions. While functional analyses were not performed on the altered lymphocytes, he states, "The consistent finding of recurrent and intercurrent infections strongly suggests that the symptomatic patients are immuno-compromised." The reactive patients also experienced a serious loss of mononuclear cell viability.

Given these results, says Dr. Swartzendruber, amalgam's impact on immunity should be carefully studied. "It is possible that such individuals may also be susceptible to other systemic effects of heavy metal, particularly since in the rat it is clear that heavy metals can induce autoimmune disorders. Heavy metals should be carefully considered as possible etiological agents in human diseases thought to have an autoimmune component."[54]

The relationship to depression. Because mercury is so soluble, it can go through the roof of the mouth to within less than an inch of the posterior pituitary gland, which has much to do with our outlook on life. When these glands do not function properly, depression may result. As Dr. Huggins says, "It's not the stress that gets us; it's how we interpret the stress."[55]

Mercury intoxication also has been linked to mental symptoms such as psychasthenia, which affects one's ability to make trivial decisions, resolve doubts, resist compulsions or phobias and perform simple intellectual tasks. Other symptoms include a lack of self-confidence and extreme timidity; a self-effacement that can cause severe depression; moodiness, rage and anxiety; and an irrational fear of death. And in other cases, mercury exposure causes an extreme form of fatigue that overwhelms its victims and confines them to bed because they no longer have the physical and mental strength for everyday activities.[56]

General health problems - and particularly those related to mental health - were 45% greater in patients with amalgams in a study conducted by Dr. Robert Silberud of Colorado State University. Among the common symptoms were sudden unexplained anger, irritability, anxiety and depression. One year after 86 of the test subjects had their amalgams removed, 70% of the recorded symptoms had either decreased or disappeared.[57]

The effects on kidney functioning. The impairment of kidney functioning from mercury amalgam may be even more severe than previously thought, according to another study by Drs. Vimy, Lorscheider and others. Again, the researchers placed amalgams in the teeth of sheep (whose weight and chewing mechanism compare well with those of humans). Within 30 days, the sheep lost half of their kidney function, and beyond that point the functioning remained low. Meanwhile, the average amalgam lasts 8 to 10 years, allowing for extensive mercury exposure.[58,59]

The effects on blood and bone cells. Preliminary studies at Colorado University indicate that blood and bone cells may be highly sensitive to mercury. Researchers found that mercury in a ratio of less than 40 parts per billion was lethal to white blood cells. Another study found that mercury concentrations of less than 0.4 parts per million killed bone cells. Yet it is estimated that at least 700 times more mercury than this amount rests in the gum tissue next to amalgam fillings.[60]

Miscellaneous findings. In 1991, two new studies identified other damaging effects of mercury amalgam. Medical researchers at the University of Kentucky established a probable relationship between mercury amalgam exposure and Alzheimer's disease and cardiovascular disease. Meanwhile, microbiologists at the University of Georgia found that mercury from fillings inhibits the effectiveness of antibiotics.[61]

The ADA Controversy

How great is the danger from mercury amalgam? That question stirs hot debate between those who question its use and those who promote amalgam as a safe and effective compound.

By conservative estimates, the average adult American has 10 fillings of three surfaces each piece. If each of these surfaces leaches one microgram of mercury per day (the generally accepted figure), then the average adult faces potential exposure to 30 micrograms of mercury a day from amalgams alone.[62] The Food and Drug Administration cautions against *any* increase in the daily mercury exposure rate from food of 2.89 micrograms.[63]

The Toxic Element Research Foundation estimates that people with 13 or more amalgams exceed the World Health Organization's daily mercury limit of 42.9 micrograms. Says TERF: "The compelling fact about this data is that it does not include the mercury exposure received from all possible sources, such as the altogether different categories of food, air and saliva."[64]

Other experts agree that even low doses of mercury exposure deserve careful investigation. "It is tempting to summarily conclude that such exposures result in no adverse effects since there is no readily identifiable, general affliction associated with the use of amalgam and stainless steel in dentistry," states Dr. Swartzendruber of the University of Colorado.

"However, low-dose, chronic exposure to any substance tends to have insidious and often highly complex sequelae which may be multifactorial and interactive," he explains. "Also, recent innovative experiments demonstrate that low-dose mutagenesis is significantly greater than previously purported."[65]

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Despite these concerns, the American Dental Association claims that amalgam is unsafe only for the 1% of Americans that it estimates to be hypersensitive to mercury. While offering no proof of amalgam's safety, the ADA insists that "the continuous use of dental amalgam as a restorative material does not pose a health hazard to the nonallergic patient."[66]

The results of other research, however, call the ADA's estimate of mercury hypersensitivity into question. Studies cited by the *Journal of the Massachusetts Dental Society* indicate that the level of hypersensitivity is 10 times higher. One study of 1,538 people found 9.6% to be hypersensitive; another study of 1,000 subjects put the number at 11.3%.[67]

And what if the ADA's estimate *were* accurate, asks TERF. Even that 1% is 1,000 times greater than the level of exposure considered adequate grounds for a recall in the auto industry. In one instance, says TERF, more than 100,000 vehicles were recalled because of a single non-fatal injury caused by a hazardous automobile material.[68]

In its staunch support of amalgam, the ADA claims that "when mercury is combined with the metals used in dental amalgam, its toxic properties are made harmless." As a result, it says, "For most patients...dental amalgam remains a safe and effective material for filling cavities."[69]

But when it comes to the cold, hard facts, the ADA's defense of mercury stands on shaky ground. The ADA no longer maintains that amalgam's safety has been scientifically proven, says the Academy, and it offers no certification of the safe and effective use of mixed amalgam. In fact, the ADA says amalgam cannot be certified because it is mixed by individual dentists who must take responsibility for the material's safety.[70,71]

The ADA relies heavily on amalgam's widespread use over the past 150 years as evidence of its safety. The organization suggests that "the most convincing support we have for the safety of dental amalgam is the fact that each year more than 100 million amalgam fillings are placed in the U.S."

This rationale offers little comfort to those who question amalgam's use. "This is a chilling thought," says the International Academy of Oral Medicine and Toxicology, Calgary. "It should be a cause for concern that approximately[72] million tons of mercury are used annually in dentistry, much of it being placed into the teeth of Americans."[72]

The ADA also has claimed that people are exposed to more mercury from fish than from dental amalgams, a statement the Academy challenges because the scientific evidence proves otherwise. Says the Academy: "Autopsies of people with fillings confirm that the amount of exposure to dietary mercury is apparently much less than that from dental amalgam mercury. Authorities in the field of metal toxicology have concluded that this chronic exposure from dental fillings makes the predominant contribution of human exposure to mercury."[73]

The ADA's position may be best illustrated by its response in 1983 to a study that measured mercury in the expired air of humans. The ADA stated: "We wish the public to be as certain as we are that dental amalgam is safe, and we will pursue this matter until that certainty is assured."[74] Note the wording, "until that certainty is assured." A scientific study does not set out to "assure" any one viewpoint, but to conduct an open inquiry that not only recognizes new information but follows that evidence wherever it may lead. In 1984, the ADA did alter its position slightly to admit that mercury does indeed escape from amalgam. But it still maintained that the amounts in question were too small to cause any damage to the body.[75]

But the ADA continues to deliver its flawed argument through the popular press. One recent *Reader's Digest* editorial, which was adapted from the *ADA News*, reports that "about 0.7 nanograms of mercury were in each gram of blood in people with silver fillings, compared to 0.3 nanograms in those without fillings."

Since the FDA considers 20 nanograms per gram of blood to be safe, says the editorial, "researchers calculate that it would take 100 fillings to reach this level - to reach the lowest toxic level of mercury, a person would require 1,000 fillings." The article ends with the standard ADA conclusion: "Silver fillings do not pose a health hazard to the nonallergic patient."[76]

But again, this argument conveniently overlooks some basic facts about how mercury is stored in the body. As Dr. Huggins explains: "The logic is based on the erroneous assumption that blood-mercury levels for subacute exposures are indicative of actual mercury contamination. The fact that the blood-mercury levels are not good indicators of total body burden is well-established in literature."

Thirty years ago, a study reported that mercury is rapidly cleared out of the blood after an intravenous injection, says Dr. Huggins. In 1972, researchers Friberg and Vostals found that mercury concentrations in blood were "hardly suitable" in evaluating retention.[77] And in 1980, Phelps and Clarkson found that "a low mercury level in blood may falsely imply that significant mercury exposure has not occurred when, in fact, a dangerously high target tissue exposure may have existed."[78]

While the ADA defends the use of mercury amalgam, the Environmental Protection Agency has defined it as a hazardous substance. On behalf of the EPA, the U.S. Justice Department brought a lawsuit in 1988 against a group of New England dentists and dental companies for damages caused by the faulty disposal of scrap amalgam. All parties involved eventually signed consent decrees that required them to reimburse the EPA a total of roughly $350,000 for its clean-up costs.[79]

According to a 1989 issue of the *ADA News*, when the EPA was asked whether it considered dental amalgam to be a hazardous substance, it replied that "any substance that contains a listed hazardous substance is itself a hazardous substance," provided that there is "a release, or threatened release, of a hazardous substance into the environment and where the government has incurred response costs."

In addition, the EPA sent a letter to one of the dental supply firms in 1988 that specifically refers to amalgam as a hazardous substance: "The term 'hazardous substance' shall have the same definition as that contained in Section 101(14) of CERCLA and includes scrap or waste dental amalgam and any mixture of such hazardous substances with any other substances."[80]

The Food & Drug Administration, for its part, has neatly skirted the issue of amalgam safety over the years. When 1976 legislation required the FDA to classify all medical and dental devices, the agency "grandfathered" its approval of the long-used amalgam fillings under the GRAS (generally recognized as safe) category, according to Joyal W. Taylor, DDS, who founded the Environmental Dental Association to spearhead a movement for informed consent legislation concerning amalgam's use.[81]

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One decade later, in 1987, the FDA's Classification of Dental Devices was published in the Federal Registry. Dental amalgam, it turned out, was not even listed as a dental device, based on the rationale that amalgam is a reaction product. Instead, the FDA classified the components of amalgam, which means that amalgam itself has never been approved as a dental device, says the Environmental Dental Association. "Thus, amalgam has never been subjected to the rigorous biocompatibility testing required of all other medical implant devices."[82]

In early 1991 the FDA clarified its position on mercury amalgam. After "reviewing" the subject, the agency announced that the use of amalgam could not be condemned based on current evidence. It recommended that more studies on the subject be conducted. At the same time, the FDA's Dental Products Panel of the Medical Devices Advisory Committee held a public meeting and, again, declared that the evidence against dental amalgam was not sufficient to prove its harm. This panel also said that amalgam should be researched further.[83]

The National Institutes of Health has taken the same stance on the amalgam issue. The NIH's mid-1991 conference on the "Effects and Side Effects of Dental Restorative Material" reached the following conclusion: "There is no scientific evidence that currently used restorative materials cause significant side effects. Available data do not justify discontinuing the use of any currently available dental restorative materials or recommending their replacement." Interestingly, however, the NIH did recommend that dentists could "reduce environmental contamination" by installing devices in their offices to recover waste amalgam residue for recycling.[84]

Questions of Liability

The ADA's position on mercury carries considerable weight. Since state dental boards operate as the long arm of the ADA, its philosophy trickles down to the local level. In fact, dentists who malign mercury as hazardous are threatened with expulsion from the ADA in four states.[85] And the dental leadership in several states threatens to censure dentists who inform patients that amalgam contains mercury.[86]

What's more, the ADA systematically harasses dentists who place alternative fillings. Those who remove amalgams, even at the patient's request, may face blacklisting in the dental and business communities. In states that require dentists to have liability insurance, the dental boards can exert some influence on the insurers, perpetuating the myth that it's dangerous to remove amalgams. If an insurance company then cancels a dentist's policy, the state dental board may suspend his or her license for failing to maintain insurance.[87]

The attempts at censorship continue to this day. A case in point: In late 1991, the Washington Dental Disciplinary Board proposed legislation that would make it unethical for dentists to replace "clinically serviceable" amalgam fillings for health purposes, reports the Environmental Dental Association. The proposal, which would have made replacement work a punishable offense, did not pass at that time.

Several months later, the board dropped its final proposal to regulate amalgam replacement. This move followed the demand of anti-amalgam advocates that two of their experts be allowed to testify. As a result, the board withdrew its previous statement that the safety of amalgam has been scientifically proven. Had the proposal passed, it would have required dentists to inform patients of the scientific difference of opinion regarding amalgam before removing serviceable fillings. The board dropped this idea when it realized that dentists would have to inform patients of the same schism *before* they placed fillings.[88] The ADA also vehemently opposes any legislation that seeks to inform patients of dental amalgam's contents. This position, of course, appears to contradict its argument that amalgam does not cause harm. But the ADA has managed either to lessen the impact of informed consent legislation at the state level (such as Alaska's 1989 initiative to inform patients of the content of various dental fillings) or to defeat it entirely. The end result is that dental patients remain ignorant of amalgam's contents and do not have a choice of using alternative materials.[89]

In New Mexico, for example, such legislation was voted down by the very committee that had unanimously passed the same legislation one week earlier, according to the Environmental Dental Association. And in Illinois, the House of Representatives passed a Right-to-Know, Informed Consent Resolution in 1991 that eventually backfired. The resolution directed the State Department of Health to examine the amalgam issue and report its findings to the General Assembly. The position paper resulting from this directive took the ADA's position that mercury dental amalgams are safe.[90]

As recently as early 1992, however, one state offered a ray of hope in getting such legislation on the books. The California State Assembly became the first to pass an informed consent bill that requires dentists to tell patients about mercury exposure before placing fillings. Although the bill (SB 934) awaits final approval, says the Environmental Dental Association, "it represents a significant victory in the process to provide dental patients with their due rights."[91]

Indeed, the ADA's relentless support of mercury may come back to haunt it when the organization can no longer hold back the tide of evidence at its gate. Already, in late 1991, a large group of dentists filed a class-action lawsuit against the ADA, charging the organization with fraud and negligence, among other things, in its promotion of amalgam as a safe material despite evidence to the contrary. The plaintiffs claim that their reliance on the ADA's misrepresentation of the facts regarding amalgam's adverse effects has harmed the doctor-patient relationship and the public health.[92]

What's more, the public sector has been galvanized in recent years regarding the amalgam issue. Since 1988, a grassroots movement of Dental Amalgam Mercury Syndrome (DAMS) patient support groups has taken hold; and in one six-month period in 1991, more than 500 "Amalgam Adverse Reaction Reports" were filed with the FDA. Also in 1991, the first product liability lawsuit related to mercury poisoning was filed against a dental amalgam maker in Tennessee.[93]

In the coming years, then, patients who are harmed by mercury amalgam may begin to bring lawsuits against the dentists who placed toxic substances in their mouths without the patient's knowledge or informed consent and those who purposely concealed facts about the filling's content.[94]

It's no great stretch, after all, to question whether the ADA has covered

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up information about amalgam's dangers. As Dr. Huggins says, there's no logical reason for the ADA's refusal to recognize amalgam as a problem. At this point, thousands of patients have responded favorably to its removal. "There's certainly been an active effort to keep the information from getting out," he says.

Dr. Huggins, for one, used to spend a great deal of time lecturing to dental associations on the topic of dental amalgam. But then the engagements came to a screeching halt. "I used to lecture 100 days a year to dental groups, and all of a sudden I was told that if I were on a dental program, there would be no post-graduate credit given for that program," he says. "And there's never been an invitation since. Approximately 18 months of bookings were cancelled in one week."[95]

Dr. Sam Ziff, an author and researcher who has studied this topic for years, believes that a political power play is at work, with the issue of legal liability lurking in the background. "I think what they're really hoping for is that the problem will just slowly fade away as more and more of the alternative materials are used and the use of amalgam is stopped" says Ziff.

He points to a similar situation that took place in Sweden several years ago. A special commission declared amalgam to be an unsuitable dental filling, says Ziff, but the medical and dental establishment applied political pressure until the commission recanted its statement publicly.

When scientists took the commission to task on national television, says Ziff, the Swedish Social Welfare and Health Administration made an historic about-face and supported the original statement against the use of amalgam. As this case illustrates, says Ziff, "There is a lot of political pressure being brought to bear. They've been using it for 150 years, and nobody likes to admit they've been wrong for that long."[96]

That's exactly what the Swedish agency did, however, when it declared amalgam to be "an unsuitable and toxic dental filling material which shall be discontinued as soon as suitable replacement materials are produced," according to a Swedish newspaper. An official said: "We now realize that we have made a mistake. This has caused people to suffer unnecessarily."[97]

In 1991, Sweden announced that the use of amalgam will be banned. And in early 1992, Germany's Department of Health followed suit by prohibiting the sale of "conventional" (gamma-2) amalgam. (The agency maintained that non-gamma-2 amalgams are safer than the banned variety, a position the Environmental Dental Association questions.) Much like the ADA, the German Dental Association had claimed all along that mercury cannot escape from amalgams. This position, of course, was in direct contrast to the scientific evidence on the subject.[98]

Amalgam Removal

Fortunately, the many problems created by amalgam respond to a simple solution: removal of the offending fillings. Indeed, the symptoms that abate with the removal of amalgam parallel those created by its use. These include seizures, muscle tremors, chronic fatigue, memory loss, depression, headaches, menstrual disorders, joint pains, intestinal problems and irregular heartbeat.[99]

All of these disorders, and more, have been cured by amalgam removal. And to date, approximately 1,500 dentists in the United States advocate the removal of amalgam and replacement of the filling with alternative materials.[100]

At the Huggins Diagnostic Center, 85% of patients who have their amalgams removed respond positively. Over the years, Dr. Huggins has used several dozen tests to monitor the effects of removal. "A frightening observation is that we (are) able to find affirmative changes in all of those tests after amalgam removal in the majority of patients observed," he says.[101]

What follows are a few examples of disorders that improved following amalgam removal:

Decreased white cell count. When amalgams were removed from three patients, their number of T-lymphocytes (white cells) increased, according to a 1984 report by Dr. David Eggleston in the *Journal of Prosthetic Dentistry*. These cells, which combat invaders such as viruses, bacteria and parasites, decreased again when the amalgams were put back in the patients' mouths.[102]

Seizures. In his book, *It's All In Your Head,* Dr. Huggins tells of an 11 year-old girl who was having seizures every 15 minutes, which prevented her from walking, standing or talking. Neurologists had failed to diagnose or treat her problem. The girl had three fillings removed, and her seizures stopped five days later. Two years later they still had not returned.[103]

Lupus erythematosis. A 48 year-old woman with 38 amalgams was suffering not only from lupus but also from vision disorders, gastrointestinal problems and skin rashes, says Dr. Sam Ziff. The fillings were removed over a three-month period, and a follow-up examination five months later found her to be symptom-free.[104]

Multiple sclerosis. When a commercial pilot began to have trouble seeing and walking, he was diagnosed as having multiple sclerosis. His level of functioning became so poor that his pilot's license was in jeopardy. At the Huggins Diagnostic Center, he had 15 amalgams removed The man experienced rapid improvement in his vision, balance and ability to walk. Today, he is still a fully competent pilot.[105]

But here's the interesting part: According to the ADA's Code of Ethics, any dentist who removes a serviceable amalgam filling from a nonallergic patient for the purpose of removing toxic substances (such as mercury) from the body is acting unethically. The ADA's 1987 edict specifies that the treatment is improper when it is "performed solely at the recommendation or suggestion of the dentist."[106]

In an accompanying statement, the ADA said, "There is no scientifically documented evidence of a cure or improvement of a specific disease or malady due to removal of amalgam restorations from a nonallergic patient." While some dentists may have a "good faith disagreement with the established scientific position on the issue," said the statement, that belief does not justify the removal of amalgam given the lack of credible evidence.[107]

A Challenge to the ADA

A lack of credible evidence? Experts on the topic would beg to disagree. The Academy, for one, issued this response in mid-1990 to the ADA's then-recent statement of confidence in amalgam: "Given the inconsistencies between the scientific facts and the American Dental Association Special Report, the (Academy) has serious concerns regarding the ADA's lack of scientific rigor and the tendency to misinform the dental profession and, thereby, the public at large regarding the established scientific facts about amalgam safety."

"We hereby call to task the ADA for failure to adequately support their position

on dental amalgam with hard scientific data. This failure has resulted in inadequate protection to the public and inadequately protects the membership of the ADA from personal harm due to amalgam usage."[108]

Likewise, researchers at the University of Calgary reached this conclusion following their 1989 study of amalgam: "Our findings are at variance with the anecdotal opinion of the dental profession, which claims that amalgam fillings are safe. Experimental evidence in support of amalgam safety is at best tenuous. From our results, we conclude that dental amalgam can be a major source of chronic mercury exposure."[109]

Today, the burden of proof regarding amalgam's safety lies with those who defend its use, says Dr. Penzer. Its advocates must offer convincing support of their position, given the many studies that show a substantial danger in using mercury amalgams. "Only valid scientific evidence of safety could possibly justify the continuation of amalgam use in dental practice," he says.[110]

As the debate heats up, many scientists have questioned the continuing use of mercury amalgam or have called for an outright ban on its use. "There is no safe level of mercury at all," says Dr. Jay Dooreck.[111] Toxicity experts such as Thomas Clarkson of the University of Rochester Medical School and Lars Friberg of the Karolinska Institute also argue against the notion of a "safe" level of mercury exposure.[112]

Dr. Huggins, for his part, says the immune suppression caused by mercury exposure "may well prove to be the most invasive disease of our time."[113] And Dr. Vimy has stated that the use of dental amalgam "should be banned immediately."[114]

For a frontier society such as the United States, however, the challenge is to rise above our history of exploiting natural resources without regard for the long-term consequences. Much like the strip mine, harmful pesticides and deforestation, mercury amalgam is a legacy to our pay-later society. But the days of indiscriminate use of our resources are long gone, and we must now establish a new ethic in tune with our new reality.

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