

A Scientific Response to the American Dental Association's Special Report and Statement of Confidence in Dental Amalgam

Preamble

In 1985 the International Academy of Oral Medicine and Toxicology (IAOMT) reviewed the transcript of the National Institute of Dental Research (NIDR) Workshop on the Biocompatibility of Metals in Dentistry¹ and the then available scientific literature and concluded that there was reasonable doubt about the safety of dental amalgam. We recommended that:

The use of mercury/silver fillings should be discontinued until such time as primary pathological evidence of amalgam safety is produced.

Since that time, there have been a series of published statements/articles from the American Dental Association (ADA) and Canadian Dental Association (CDA), all claiming that dental amalgam was safe for use as a filling material. None of these pronouncements referenced or provided any basic scientific research showing the safety of amalgam. Since the majority of dentists in North America rely on the guidelines of the leadership of the ADA, the CDA and the NIDR, it is imperative that these organizations be scientifically accurate when they make statements to the profession which can affect the public health. To address this issue of accuracy the following scientific response was prepared by the Board of Directors of IAOMT on behalf of our members. Claims of alleged safety are compared with the documented scientific literature.

Since our 1985 recommended moratorium on future placement of mercury/silver fillings, scientific research has furthered reinforced the basis for our concern. The IAOMT acknowledges that primary pathological data linking mercury from dental amalgam with any specific disease is not available. This would in fact be impossible because primary studies have never been undertaken. However, we understand that such investigations are currently underway, partially funded by this academy.

Dr. Boyd Haley, professor of Chemistry at the University of Kentucky, stated that, “*proof of causation is extremely hard to produce by today's rigorous scientific standards. We already know that there are at least two or three other factors in the disease condition we call Alzheimer's Disease (AD). There are probably other factors we do not yet recognize. Mercury appears to be associated with Alzheimer's. What we can say is that exposure to mercury vapor would produce neurological damage and dementia that would be indistinguishable from Alzheimer's disease.*”

The Agency for Toxic Substances Disease Registry in 1993 released the current toxicological profile for mercury. Their acute exposure standard, 20 nanograms of mercury per cubic meter of air (.020 µg), is substantially below the current measurement capabilities most mercury testing equipment. It is virtually impossible for dentists to mix and place amalgam without exceeding the acute dose standard. This standard is promulgated by the U. S. Public Health Service. This Academy in the interest of public safety, wish to emphatically reaffirm our 1985 position that the use of this material should cease.

In April of 1990 the ADA published a Special Report entitled When your patients ask about mercury in amalgam.²

This American Dental Association Special Report is of concern because it omits information and contains misinformation which misleads patients and dentists regarding amalgam safety. This misinformation could have a serious impact, preventing patients from making an accurate informed consent. The IAOMT has reviewed a few of the pertinent statements and compared them to the published and documented scientific facts.

Item I American Dental Association's: Special Report

The Patient Asks,
"But isn't mercury poisonous?"

The ADA Answers,
"Not when used in dental amalgam. Alone, in the form scientists call elemental mercury and the public sometimes calls quicksilver, mercury is toxic at high concentrations. However, when mercury is combined with other metals, such as the silver, tin, and copper, it reacts with them to form a biologically inactive substance."

IAOMT Response: The ADA answer is false and misleading.

It fails to mention that set dental amalgam continuously releases mercury.

*"It is a fallacy that mercury is neutralized when it is combined with other components of silver dental amalgam. The laws of physical chemistry are followed. Mercury is diluted by the other components of amalgam in what may be considered a solid solution. Although the vapor pressure of mercury is reduced, mercury vapor is still released. An identical situation arises when alcohol is diluted by water."*³ Research has shown that mercury even in extremely small amounts has toxic effects, for example, low dose mercury exposure has been shown to produce neurological pathology, cytotoxicity to nerve tissue.^{4 5 6 7 8 9 10 11 12 13 14 15}

We find it particularly disturbing that the ADA has made such a blanket statement without any scientific support.

Item II American Dental Association's: Special Report

The Patient Asks,
"Does the mercury come out of my fillings when I eat or chew gum?"

The ADA Answers,
"Recent advances in both equipment and measurement techniques have allowed researchers to detect extremely low levels of mercury vapor in patients' breath after they have chewed vigorously. Very small quantities of this mercury vapor are absorbed by the body instead of being exhaled. But no evidence exists that associate this minute amount of mercury vapor with any toxic effects."

IAOMT Response: The ADA answer is false.

Published experimental evidence as early as 1926 has demonstrated that mercury is not locked in, but is released from fillings.¹⁶ More recent research has shown that both chewing and tooth brushing release mercury vapor into the human oral cavity.^{17 18 19}

Recent advances in both equipment and measurement technique have allowed researchers to find intra-oral mercury levels thirty to one hundred times higher than the United States Environmental Protection Agency's (USEPA) maximum allowable concentration for air quality. (1 part per million)^{20 21 22 23 24 25 26} Toxicology authorities maintain that there is no threshold level of mercury exposure which can be considered totally harmless.^{27 28}

Dental fillings release mercury. The mercury release dramatically increases with pressure or heat stimulation to the fillings and does not return to baseline for more than 90 minutes.^{29 30} This continual release of mercury will inevitably result in measurable exposure from the 17,000 breaths that a person inhales daily. Once this mercury is inhaled 74% to 100% of the mercury is absorbed from the lung into the blood stream and distributed throughout the body.³¹ Personal habits such as chewing gum, grinding teeth and mouth breathing will greatly increase an individual's daily dose exposure to dental amalgam mercury. The 1/2 life for mercury in humans is approximately 70 days. Thus, small multiple daily doses of mercury will result in a significant accumulation over time. The critical issues are the potential for exposure to the developing fetus and mercury accumulation in children because of their low body weight.

To study these possibilities Vimy et al. (1990) designed an elegant animal experiment utilizing sheep and radioactively tagged mercury²⁰³. Twelve occlusal amalgams were placed in the molars of pregnant sheep. The mothers femoral vein, the placental sack and the femoral vein of the fetus were cannulated.^{32 33} Radioactivity measurements determined the presence and quantity of mercury from the dental amalgam fillings in the various body tissues of both the mother and fetuses. The experiment is specific for mercury from fillings, since radioactive mercury is not a naturally occurring substance in the environment. The design of this experiment eliminates the issue of mercury source.

- 1) Within 3 days after amalgam placement mercury was found in the maternal blood, amniotic fluid, fetal blood, and maternal urine and feces.
- 2) By 16 days after amalgam placement the maternal mercury levels were highest in the kidney, liver, G.I. tract, and thyroid. The mercury levels in the fetus were highest in the pituitary, liver, kidney, and placental cotyledon.
- 3) At 33 days after amalgam placement (birthtime), most fetal tissues had higher levels of mercury than the maternal tissues. Specifically, the fetal liver, epiphysial bone, bile, bone marrow, blood, and brain.
- 4) During lactation there was 8 times more mercury in the milk than maternal blood serum. This resulted in an increase in mercury exposure to the neonate.
- 5) Seventy-three days after amalgam placement, mercury levels in the maternal kidneys, liver, parotid glands, pancreas, pituitary glands, urine, bile, brain, and thyroid were still rising slowly.

The researchers concluded that mercury vapor released from dental amalgam fillings is readily absorbed in lung, gastrointestinal tract and jaw bone and progressively accumulates in maternal and fetal tissues with exposure duration. Neonatal mercury exposure from this dental material occurs via milk. They stated in their conclusions that, *“our laboratory findings in this investigation are at variance with the anecdotal opinion of the dental profession, which claims that amalgam tooth fillings are safe.”*

Item III American Dental Association's: Special Report

The Patient Asks, “Are there other sources of mercury?”

The ADA Answers, “Absolutely, a major source of mercury exposure is from fish in the diet. . . . Research shows that you may be exposed to more mercury from fish than from dental amalgams.”

IAOMT Response: The ADA answer is scientifically inaccurate and misleading.

In contrast to the ADA position, it has been scientifically concluded that mercury/silver fillings constitutes the largest source of inorganic mercury exposure to the general population and this exposure exceeds organic mercury exposure from fish.³⁴ Autopsies of people with fillings confirm that dietary mercury exposure is apparently much less than from dental amalgam mercury.^{35 36} 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.³⁷

Item IV American Dental Association's: Special Report

The Patient Asks, “Are these other materials safe?”

The ADA Answers, “The ADA has approved a number of them as ‘safe and effective,’ and I have confidence in that seal of approval. The profession has been using amalgam for more than 150 years, and some of these newer materials have been around for only a decade or less, so we don't have the long-standing history of safety with them that we have with amalgam.”

IAOMT Response: The ADA answer is misleading.

There is no ADA certification for the mixed amalgam as, “safe and effective.” The ADA has maintained that mixed dental amalgam is a reaction product manufactured by the individual dentist and therefore cannot be certified and it is the responsibility of the individual dentist to determine the efficacy of the materials and their appropriateness for each patient.³⁸ One reading this paragraph is given the distinct impression that dental amalgam has the ADA seal of approval as, “safe and effective” and has been certified. What has been certified is the purity of the mercury and the composition of the silver alloy.

Item V American Dental Association's: Special Report

In the *statement of confidence in amalgam*, the ADA no longer maintains that the safety of this dental implant has been scientifically proven but relies on the anecdotal opinion of 150 years of “successful” use.

ADA states, “The strongest and 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 United States.”

IAOMT Response: This is a chilling thought. It should be cause for concern that approximately seventy-two tons of mercury are used annually in dentistry, much of it being implanted in the teeth of North Americans without any proof of safety. “The absence of evidence is not evidence of absence” (Carl Sagan).

Historically numerous common products were thought to be safe; for example asbestos, lead, and DDT. In each case the scientific concerns were immediately discounted by the industry responsible for the production or use of the material and often the assertions of safety were initially supported by the responsible government agencies. After a period of time as the evidence became overwhelming and legal liability impossible to ignore, they were regulated or withdrawn from the market. Each of these products demonstrated pathology after a latency period of chronic low dose exposure as does mercury. Moreover, the resulting pathology from mercury tends to be of a medical nature and would not be apparent to most dentists. Thus, in the case of amalgam mercury exposure, if a health problem should exist, most dentists are not trained to diagnose such a condition and most physicians would not be aware of the possibility that mercury from fillings might have induced the pathology.

Item VI American Dental Association's: Special Report

The ADA *statement of confidence in amalgam* claims, “The Food and Drug Administration in 1987 classified mercury amalgam as a Class I dental device.”

IAOMT Response: The ADA statement is false.

In fact, the FDA in 1987 classified the alloy and the mercury components of mercury amalgam separately. They refused to classify the set amalgam reaction product.

Item VII American Dental Association's: Special Report

The Patient Asks, “If there is any question at all, wouldn't it be wise for concerned patients to simply have their amalgam fillings removed and replaced with other materials?”

The ADA Answers, “Unless the patient suffers an immediate adverse (allergic) reaction to an amalgam, a reaction that does not resolve in a short time, it is not advisable to have amalgam fillings removed.”

Since 1984 the ADA has claimed that the incidence of hypersensitivity to mercury is less than 1%.³⁹

IAOMT Response: The ADA answer is both false and misleading

This position is in stark contrast to the published scientific literature both before and after 1984. It has been reported that cutaneous (skin) allergy to mercury occurs in approximately 5% of the general population. Studies of those with amalgam fillings finds that between 2% - 35% test hypersensitive to mercury.^{40 41 42} None of the experimental subjects without dental amalgam tested positive for allergy to mercury. The development of this adverse reaction may not be immediate but, research shows that the incidence of allergy gradually increases with time and onset may be delayed five or more years.⁴³

Item VIII American Dental Association's: Special Report

The ADA supports their argument with five references.

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- 2) Langan, D.C., Fan, P.L., Hoos, A.A. The use of mercury in dentistry: a critical review of the recent literature. JADA 115:867-880, 1987
- 3) Fan, P.L. Safety of Amalgam. CDA J 15:34-6 1987
- 4) The Mercury Scare. Consumer Reports, March 1986
- 5) Council on Dental Materials, Instruments, and Equipment and Council on Dental Therapeutics. Safety of amalgam-an update. JADA 119:204-5 1989

IAOMT Response: The ADA bibliography cited is misleading.

The total lack of valid science to support the continued use of amalgam is apparent in the ADA Special Reports bibliography. They cite only review articles and lay media reports and no primary research into either animal or human physiological or immunological reaction to dental amalgam metal. The review articles and lay reports rely almost exclusively on measurements of mercury from blood, and urine to support their conclusions. On page 396 of the Special Report the author partially quotes the conclusion of the 1984 NIDR Workshop on the Biocompatibility of Metals in Dentistry, "*and there appears to be little correlation between (mercury) levels in urine, blood, or hair, and toxic effects.*" They thereby negate the validity of their own bibliographical references.

The scientific literature clearly does not support such an approach. Quoting directly from the research, "*Urinary mercury levels may give some indication of the degree of exposure. They are of limited value in the diagnosis of poisoning, since high levels can be found in human subjects who are symptom-free, and low levels in those exhibiting marked evidence of mercurialism. It has been suggested that, in some cases, failure to excrete mercury is a factor in the development of poisoning. Those investigators that have studied the subject are in almost unanimous agreement that there is poor correlation between the urinary excretion of mercury and the occurrence of demonstrable evidence of poisoning.*"⁴⁴

Moreover, none of the articles referenced in the ADA bibliography contain hard research. They merely cited other primary research papers to support their divergent conclusions. Many of the primary research scientists referenced in the review articles did not conclude that amalgam was safe. This bibliography would therefore be very misleading to anyone not familiar with the current research.

Item IX American Dental Association's: Special Report

The ADA utilized this Special Report to promote the sale of their patient education brochure on the safety of dental amalgam titled, Filling Dental Health Care Needs (W186). This brochure makes many of the same claims and factual errors found in the special report.

IAOMT Response: It is the conclusion of this academy that the use of this brochure alone would misinform dental patients regarding the potential risks they might undergo from having this material implanted and leave the dentist at risk of legal liability and guilty of negligent misrepresentation.

Item X American Dental Association's: Special Report

The ADA *Principals of Ethics and Code of Professional Conduct* Sect E under Research and Development, "The dentist has the obligation to make known to all the results of his investigations if they have an effect on public health."

IAOMT Response: Scientific documentation has clearly proven chronic exposure, biological accumulation, and delayed adverse immune response to mercury from amalgam fillings. The ADA, by promoting the use of this document and pamphlet W186, is apparently suggesting that dentists deliberately violate their own code of ethics and withhold vital information from their patients and the public. Such action cannot help but intentionally violate the patients right to full informed consent.

Item XI American Dental Association's: Special Report

The ADA and CDA *Principals of Ethics and Code of Professional Conduct* was recently changed to say, "the removal of amalgam restorations from the non-allergic patient for the alleged purpose of removing toxic substances from the body, when such treatment is performed solely at the recommendation or suggestion of the dentist, is improper and unethical".

IAOMT Response: We conclude that the alteration of the ADA and CDA code of ethics to indict those dentists who recommend the removal of amalgam because of suspected toxicity violated the rights of the patient to informed consent and freedom of choice between the doctor and patient. Although the Associations state that, "dentists should choose the best possible restorative material for each patient on an individual basis." this is clearly not their intent. The changes to the *Principals of Ethics and Code of Professional Conduct* restrict the dentists freedom of speech and deprive the patient of the legal right to informed consent and freedom of choice.

Conclusion

Given the inconsistencies between the scientific facts and this American Dental Association Special Report, the International Academy of Oral Medicine and Toxicology 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.

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