

Legislative Testimony
HB 5243 An Act Concerning The Use Of Mercury In Dentistry
March 7, 2012
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Senator Gerratana, Representative Ritter and Members of the Public Health Committee, I am a resident of West Hartford, Connecticut and a full-time professor in the School of Dental Medicine at the University of Connecticut Health Center where I teach graduate courses and perform research on dental materials. This position followed a 21 year, 4 month and 24 day career in the U.S. Navy. My undergraduate degree was in chemistry and I worked as a research chemist prior to attending dental school. While on active duty with the Navy I completed a Masters in dental materials science at Marquette University and the Doctor of Medical Sciences degree at Harvard University in a cross-registration program with the Massachusetts Institute of Technology. This is a PhD equivalent degree granted by the Faculty of Medicine at Harvard. For ten years I was on the faculty of the Naval Postgraduate Dental School in Bethesda, Maryland and simultaneously a guest scientist at the National Institute of Standards and Technology in the Dental and Medical Materials Group. My last tour was as Commanding Officer of the Naval Dental Research Institute. My education and professional experience qualify me to read and interpret scientific literature related to the health impacts of materials used in dentistry.

In summary, my testimony to you is that:

- Dental amalgam is a safe and effective material;
- No fully capable substitute for amalgam yet exists;
- Dental amalgam has been extensively studied in medical literature;
- All authoritative medical organizations specializing in neurological, degenerative or autoimmune diseases and psychological syndromes have independently reviewed this medical literature and have no concerns regarding amalgam fillings;
- Regulatory authorities in the U.S. and Europe have independently examined this literature and reached the same conclusion as the authoritative medical organizations;
- At least 20 state legislative or regulatory agencies have examined banning amalgam – none of these states have banned or limited its use;
- No country has banned dental amalgam due to health concerns;
- Very diverse groups from the Consumers' Union (Consumer Reports) to the Multiple Sclerosis Society to Quackwatch.org view anti-amalgam organizations, their claims and their recommendations as being from "fringe" to "malpractice";
- The economic impact of eliminating amalgam is calculated to be in the billions (\$ US).

1. Dental amalgam is not mercury

Dental amalgam, as exists in my mouth, as I have installed in my wife's mouth and will soon in that of my pastor – is an extremely safe and effective material. By definition, an amalgam is a room temperature reaction between liquid and solid metals – in this case mercury reacting with silver, copper and tin. Amalgams in our mouths are not 50% mercury (i.e., elemental or liquid), but stable metal-metal compounds – from which it is very difficult to release the mercury. Additionally, there is no methyl mercury in dental amalgam – this is the “organic” form found in fish that is of the highest health concern since it is easily digested and passed into cells.

Much of the mercury that is released from aged amalgam surfaces appears to be mercury sulfide, “...a chemical form that is bio-unavailable and unlikely to pose a toxic hazard.” (George et al., 2009). In the past ten years, instruments for mercury vapor detection have become so sensitive that it is possible to find mercury vapor, for example after chewing gum. Vapor levels are well below any known to cause concern (and most people are not “mouth breathers”). Using EPA and WHO estimates, a person having seven amalgam fillings could absorb an amount of mercury representing approximately 10% to 20% of that obtained from eating fruits, vegetables and breads (Mackert and Berglund, 1997; Clarkson et al., 1984). This dietary background amount is in agreement with a more recent two-year analysis of the French diet (LeBlanc et al., 2005).

Turns out the average Frenchman eats 9.65 micrograms of mercury each day (LeBlanc et al., 2005). Some perspective for those finding such “tiny bits” challenging: one microgram is one millionth of a gram. With gold at \$1700 an ounce, 9.65 micrograms of gold would fetch about 2 one-hundredths of a penny (2/10,000 of \$1). A 2003 article in the *New England Journal of Medicine* states that there is no scientific evidence that such low levels cause health problems.

2. Dental amalgam is effective – no true “substitute” yet exists

Amalgam fillings are considerably less expensive to place and last much longer than any other restorative material directly placed as a filling. While plastic fillings (composites) provide “satisfactory” service for approximately five years, they are replaced at higher rates and repaired at twice the rate of amalgams (Bernardo et al., 2007; Soncini et al., 2007; Mjor and Jokstad, 1993). Collins et al. (1998) reported twice the failure rate for composites as compared to amalgams by the eighth year. By 10 to 11 years, failure rates as high as 40% to 50% have been reported for composites. (Raskin et al., 1999). The average age of direct resin-based composites was reported to be seven years to eight years compared with 12 - 14 years for amalgam and 20 years for gold (Jokstad et al., 1994). One study demonstrated that multi-surface resin-based restorations were replaced and repaired at nearly twice the rate of amalgam restorations in 2,780 U.S. Navy and Marine Corp personnel during their first five years in service (Simecec et al., 2009).

3. Dental amalgam is safe

Authoritative medical organizations (outside of dentistry) have independently reviewed the scientific literature related to neurological, degenerative, autoimmune and psychological syndromes looking at amalgams as a causative agent – and found nothing.

Alzheimer's Association
National Multiple Sclerosis Society
Institute of Neurotoxicology and Neurological Disorders (Autism)
American Academy of Pediatrics

3.1 From the Alzheimer's Association website:

http://www.alz.org/alzheimers_disease_myths_about_alzheimers.asp

“Myth 7: Silver dental fillings increase risk of Alzheimer's disease

Reality: According to the best available scientific evidence, there is no relationship between silver dental fillings and Alzheimer's. Many scientists consider the studies below compelling evidence that dental amalgam is not a major risk factor for Alzheimer's. Public health agencies, including the FDA, the U.S. Public Health Service and the World Health Organization, endorse the continued use of amalgam as safe, strong, inexpensive material for dental restorations.

- March 1991, the Dental Devices Panel of the FDA concluded there was no current evidence that amalgam poses any danger.
- National Institutes of Health (NIH) in 1991 funded a study at the University of Kentucky to investigate the relationship between amalgam fillings and Alzheimer's. Analysis by University statisticians revealed no significant association between silver fillings and Alzheimer's. [The abstract for this study is posted on the *Journal of the American Dental Association* Web site.](#)
- October 30, 2003, a *New England Journal of Medicine* article concluded that current evidence shows no connection between mercury-containing dental fillings and Alzheimer's or other neurological diseases. The [abstract for this study is posted on the *New England Journal of Medicine* Web site.](#)”

3.2 From the National Multiple Sclerosis Society website:

<http://www.nationalmssociety.org/about-multiple-sclerosis/what-we-know-about-ms/treatments/complementary--alternative-medicine/index.aspx>

“Some Complementary Approaches to Avoid

- **Removal of amalgam fillings**—There is no scientific evidence to connect the development or worsening of MS with dental fillings containing mercury, and therefore no reason to have those fillings removed. Although poisoning with heavy metals-such as mercury, lead, or manganese-can damage the nervous system and produce symptoms such as tremor and weakness, the damage is inflicted in a different way than occurs in MS and the process is also different.”

3.3 Many organizations outside of dentistry have reviewed the scientific literature looking for any credible link between dental amalgam fillings and general health problems – and have found none:

U.S. Food and Drug Administration
National Institutes of Health
U.S. Public Health Service
U.S.P.H.S. Centers for Disease Control and Prevention
World Health Organization (WHO)
European Commission

3.4 From the European Commission, Health & Consumer Protection Directorate-General, Scientific Committee on Emerging and Newly Identified Health Risks
“The safety of dental amalgam and alternative dental restoration materials for patients and users” May 6, 2008

http://ec.europa.eu/health/ph_risk/committees/04_scenihp/docs/scenihp_o_016.pdf

“There have been claims of causation with respect to a variety of systemic conditions, particularly neurological and psychological/psychiatric effects, including Alzheimer’s, Parkinson Disease, Multiple Sclerosis and also kidney disease. However, several major epidemiological studies have failed to reveal such effects. These studies have included assessments in children and in pregnant and lactating women. It is generally concluded that no increased risks on adverse systemic effects exist, and indeed the most recent studies have failed to find any association between the use of amalgam and neuropsychological development in children. We do not therefore consider that the current use of dental amalgam poses a risk of systemic disease.” Pg. 53

3.5 From the WHO in a report from a meeting convened at WHO HQ, Geneva, Switzerland, 16th to 17th November 2009: “Future Use of Materials for Dental Restoration”

http://www.who.int/oral_health/publications/dental_material_2011.pdf

“In May 2008, a Scientific Committee of the European Commission addressed the use of dental amalgam and the available alternative restorative materials (23,24).The committee concluded that dental amalgams are effective and noted that none of the dental materials - amalgam and alternatives- was without clinical limitations and toxicological hazards.” Pg. 5

4. No state that has examined the issue has banned or limited dental amalgam

States where either legislative or regulatory actions were taken and terminated:

Washington, Oregon, California, Arizona, Colorado, Alabama, Georgia, Ohio, Maine, Virginia, Illinois, Minnesota, Connecticut, Massachusetts, Iowa, New Hampshire, New York, Pennsylvania, Hawaii and Vermont

5. Bans in Europe are very limited and based on environmental concerns

Two European countries, Sweden and Norway, no longer allow use of amalgam and Denmark is winding-down its use. These decisions were not based on patient health concerns but on specifics of environmental management in these countries. The US EPA estimates that dentistry contributes 0.7% of human-derived surface water mercury. This amount is likely dropping with the mandatory use of ADA Best Practices, involving higher level amalgam capture technologies in dental offices, as is mandated in Connecticut.

6. Anti-amalgam organizations, their claims and their recommendations viewed as being “fringe” to “malpractice”

Consumers' Union
Quackwatch.org
National Multiple Sclerosis Society

6.1 From the Consumers' Union: Barrett S and the editors of Consumer Reports Books. [Health Schemes, Scams, and Frauds](#). Mount Vernon, N.Y.: Consumer Reports Books, 1990.

“In CU's view, dentists who purport to treat health problems by ripping out fillings are putting their own economic interests ahead of their patients' welfare. The false diagnosis of mercury-amalgam toxicity has such harmful potential and shows such poor judgment on the part of the practitioner that CU believes dentists who engage in this practice should have their license revoked.”

6.2 From Quackwatch.org

The International Academy of Oral Medicine and Toxicology is listed as an organization of “considerable distrust” based on the following criteria:

1. Are its ideas inside the scientific mainstream?
2. Who are its leaders and advisors?
3. What are its membership requirements?
4. Does it promote a specific treatment or treatments?
5. Does it oppose proven public health measures?

6. Does it espouse a version of "freedom of choice" that would abolish government regulation of the health marketplace?
7. How is it financed?
8. Is it a real organization?
10. If it awards certifications, how stringent are its requirements?

6.3 From the National Multiple Sclerosis Society – see 3.2 above regarding therapies to avoid.

7. High cost of enforced substitution

Due to their higher materials cost, higher placement costs (more dental time) and higher replacement rates – the economic impact of an amalgam ban would be staggering. For the US, the estimated first-year impact of banning amalgams was recently estimated to be \$8.2 billion (Beazoglou et al, 2007). Based on population ratios this would amount to approximately \$96 million first year increase in dental costs for residents of the State of Connecticut.

I urge you to oppose HB 5243. Amalgam is a safe and effective filling material, as judged by the many independent analyses of major medical and governmental organizations. There is simply no compelling rationale for removing it from practices in Connecticut. It would be my pleasure to speak further with you or to provide any materials of interest.

Respectfully Submitted,

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(note: 1 = one)

Beazoglou T, Eklund S, Heffley D, et al. Economic impact of regulating the use of amalgam restorations. Public Health Reports 2007;122:657-663.

Bernardof M, Luis H, Martin MD, Leroux BG et al. Survival and reasons for failure of amalgam versus composite posterior restorations placed in a randomized clinical trial. JADA 2007;138:775-783.

Collins CJ, Bryant RW, Hodge KL. A clinical evaluation of posterior composite resin restorations: 8-year findings. *J Dent* 1998;26(4):311-317.

George GN, Singh SP, Hoover J, Pickering IJ. The chemical form of mercury in aged and fresh dental amalgam surfaces. *Chem Res Toxicol* 2009;22:1761-1764.

Jokstad A, Mjör IA, Qvist V. The age of restorations in situ. *Acta Odontol Scand* 1994;52(4):234-42.

LeBlanc J-C, Guérin T, Noël L et al. Dietary exposure estimates of 18 elements from the 1st French total diet study. *Food Additives and Contaminants* 2005;22(7):624-641.

Mjör IA, Jokstad A. Five year study of Class II restorations in permanent teeth using amalgam, glass polyalkenoate (ionomer) cement and resin-based composite material. *J Dent* 1993;21(6):338-343.

Raskin A, Michotte-Theall B, Vreven J, Wilson NHF. Clinical evaluation of a posterior composite 10-year report. *J Dent* 1999;27:13-19.

Soncini JA, Maserejian NN, Trachtenberg F, Tavers M, Hayes C. the longevity of amalgam versus compomer/composite restorations in posterior primary and permanent teeth. Findings from the New England Children's amalgam trial. *JADA* 2007;138:763-771.