

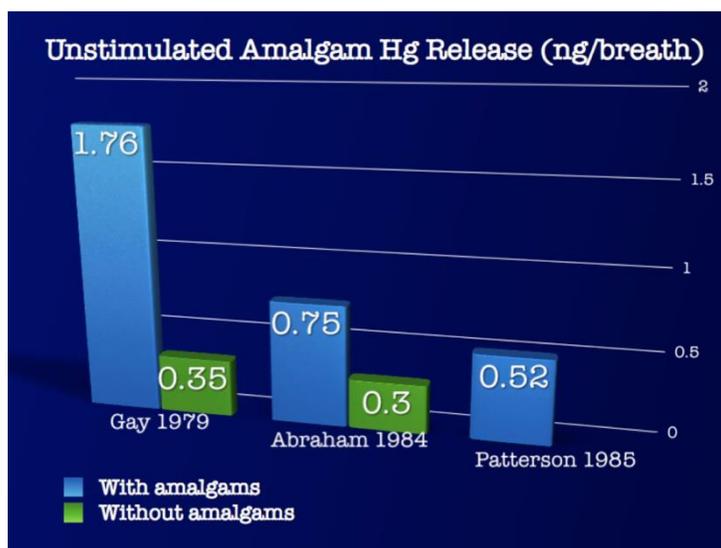
Documented Release of Mercury from Amalgams

The old dental literature is full of references that document release of mercury from amalgams.

Three classic papers from the 1970s and 1980s document how much more mercury vapor is found in the mouths of people with amalgam fillings as compared to people without fillings.

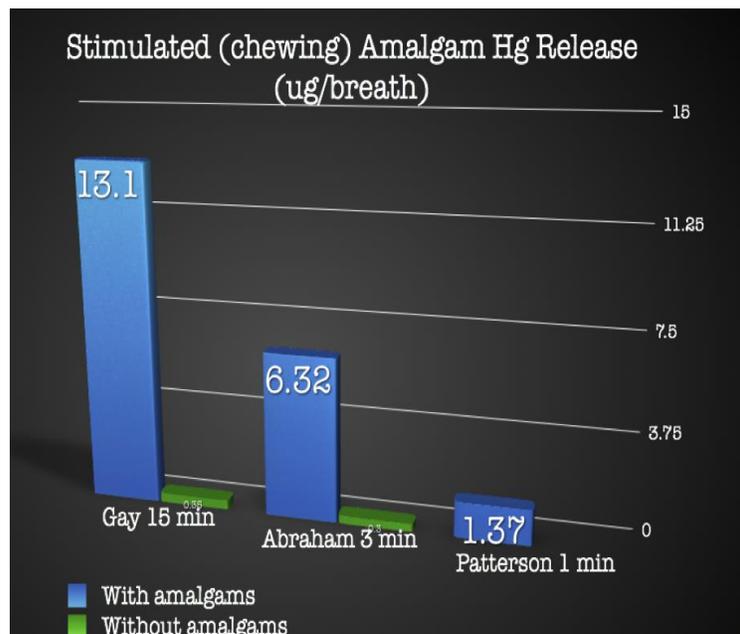
With and Without Amalgams

The following graph illustrates the results of three classic papers from the 1970s and 1980s that document how much more mercury vapor is found in the mouths of people with amalgam fillings as compared to people without amalgams. The small amount of mercury noted in the mouths of people without amalgams reflects the margin of error of the instruments used in that research.



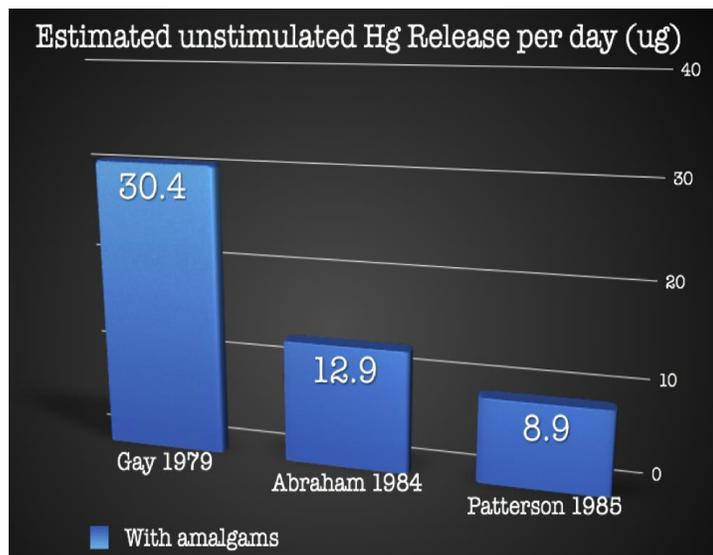
Chewing Gum

This chart illustrates how the three papers all show that chewing gum for a few minutes with amalgam fillings in the mouth raised the level of mercury release by over seven times!



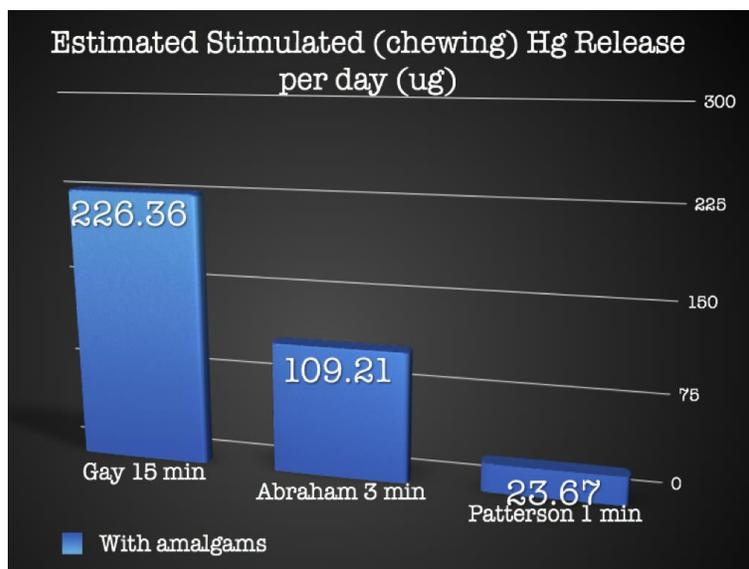
Unstimulated Release

This chart shows that without any stimulation at all, the mere presence of amalgam fillings in the mouth presents a person with real measurable quantities of mercury exposure, 24 hours a day. As we'll see in later slides, this exposure exceeds published safety limits in many cases.



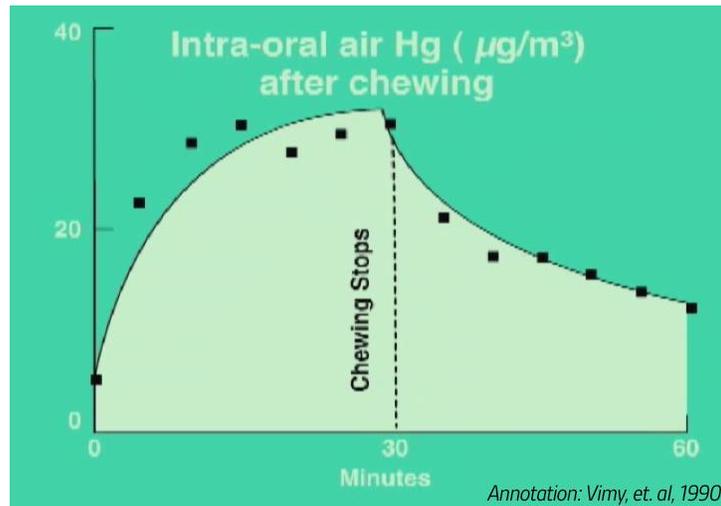
Stimulated Release

It's no secret that Amalgam fillings continuously release elemental mercury vapor into their environment. In fact it's been in the dental literature since the nineteenth century. This chart showing estimates of daily amounts of mercury exposure from amalgam fillings with chewing activity reminds us that any form of stimulation that heats an amalgam filling, like the friction of chewing gum or drinking hot drinks, will greatly increase the release of mercury vapor.

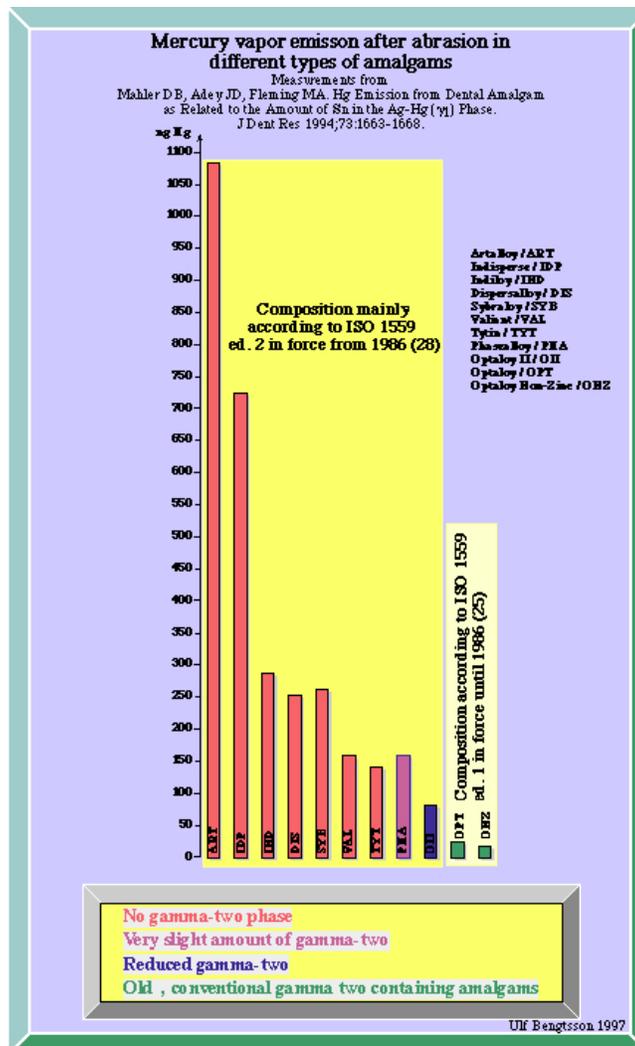


Additional Data

In this experiment, subjects with amalgam fillings had the baseline mercury levels in their mouth air measured, and then they were asked to chew gum for ten minutes. As expected, the mercury levels in their mouths shot up. But those levels took about two hours to return to baseline. The fillings kept up the excess outgassing long after the stimulation stopped.



When the release of mercury from different types of amalgam is quantified, as in this experiment, we find that the high copper, low gamma-2-phase formulas that are universally used today, actually release much more mercury than the old "conventional" types.



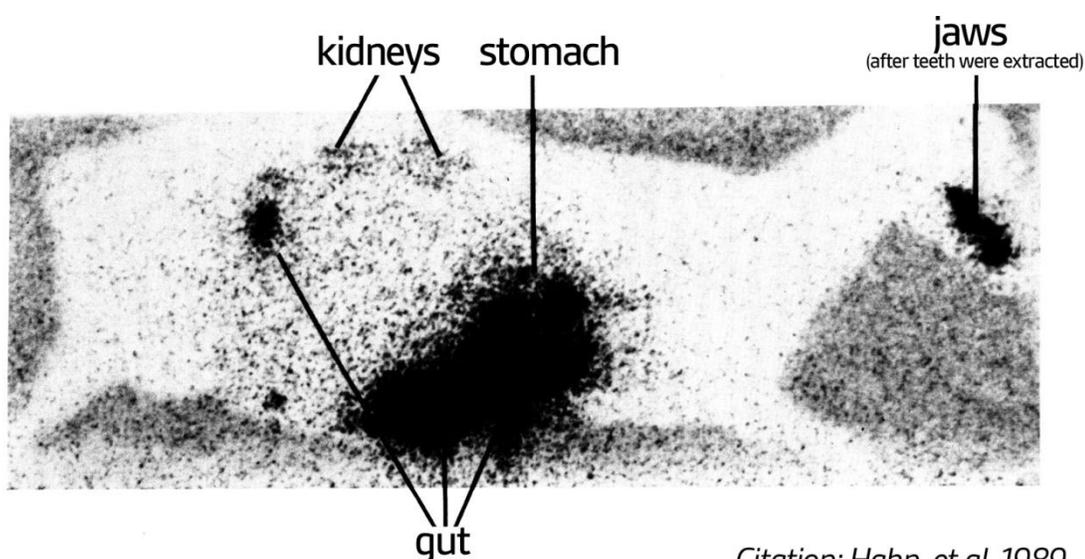
Distribution of Radioactive Mercury

In the late 1980s a research group at the University of Calgary, in Canada, including IAOMT founder Dr. Murray Vimy, did this experiment to find out if mercury from amalgam fillings could travel through the body. They placed twelve occlusal fillings in the mouth of a pregnant sheep. The amalgam was labeled with mercury-203, a radioactive isotope that is not found in nature.

After thirty days, the sheep was killed and radioactive mercury was found in all its organs, plus all the tissues of the fetus.

The Sheep's Body Scan

This picture shows the full, body scan of the animal, showing mercury concentrated in its digestive tract, kidneys, and jawbones.



Citation: Hahn, et.al. 1989

Mercury Deposit Amounts

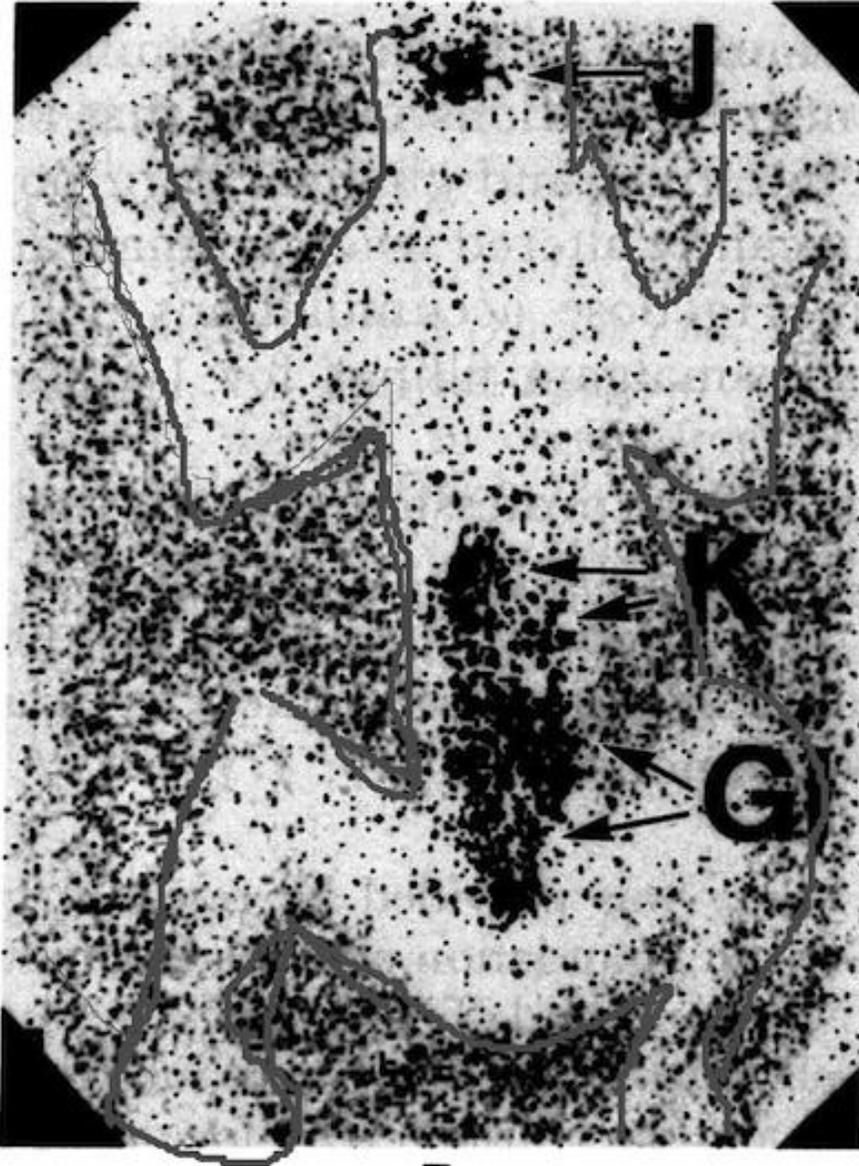
This table shows how much mercury was deposited in some of the sheep's tissues. The kidneys and digestive tract got the most, but the blood and the urine got very little. Blood and urine levels of mercury turn out to be poor indicators of the total body burden of mercury derived from amalgam fillings.

| Tissue Concentrations | ng Hg/ gram |
|-----------------------|-------------|
| kidney | 7438 |
| feces | 4489 |
| stomach | 929 |
| liver | 772 |
| alveolar bone | 318 |
| whole blood | 9.0 |
| urine | 4.7 |

Citation: Hahn et al, 1989

Results Duplicated in a Monkey

The Calgary group was criticized for using a sheep-an animal that eats and chews in a way very different from humans. So they repeated their experiment with a monkey, and found identical results. Radioactive mercury from the fillings distributed throughout the animal's body, and concentrated in the same organs as in the sheep.



Mercury Exposure

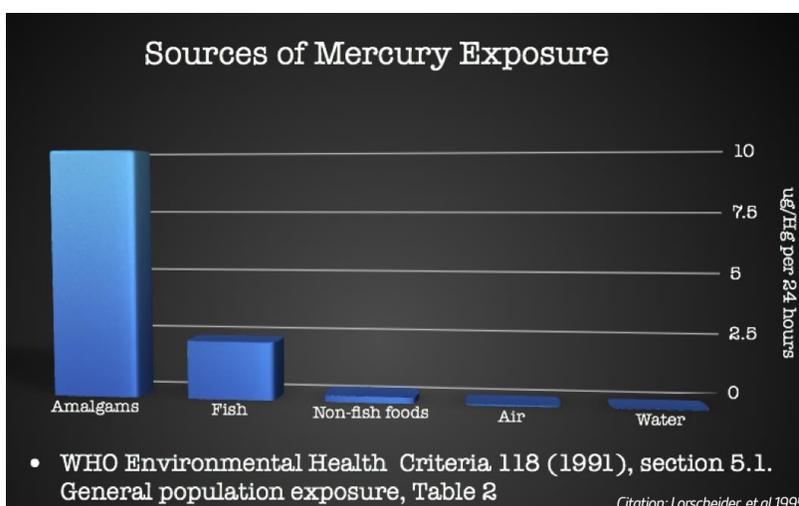
In 1991, the World Health Organization noted that when mercury amalgam was the predominant dental filling material, people were being exposed to mercury far more by their fillings than from any other source.

Documenting exposure is one thing, but to document toxic exposure, we must compare the exposure to published safety limits.

Most published estimates of amalgam-derived mercury exposure show a range exceeding those limits.

World Health Organization Mercury Amalgam Graph

In 1991, the World Health Organization published this graph, which shows that when mercury amalgam was the predominant dental filling material, people were being exposed to mercury far more by their fillings than from any other source. This is the picture we can change by eliminating the use of mercury amalgam in the future.



Exposure Exceeds Allowable Limits

Having mercury fillings in the mouth can expose people to amounts of mercury exceeding occupational exposure limits, and far exceeding limits for indoor air. In the dental office, opening an amalgam capsule or drilling out old fillings can expose dental personnel to far higher levels of mercury than is allowed for occupational settings.

The US Occupational Safety and Health Administration allows 50 micrograms of mercury per cubic meter of air in industrial settings, while the US Environmental Protection Agency allows only 0.3 micrograms per cubic meter for the general public. Exposure to amalgam under various circumstances can create mercury exposures that greatly exceed those limits.

See the What the manufacturers say: an MSDS Overview for more information.

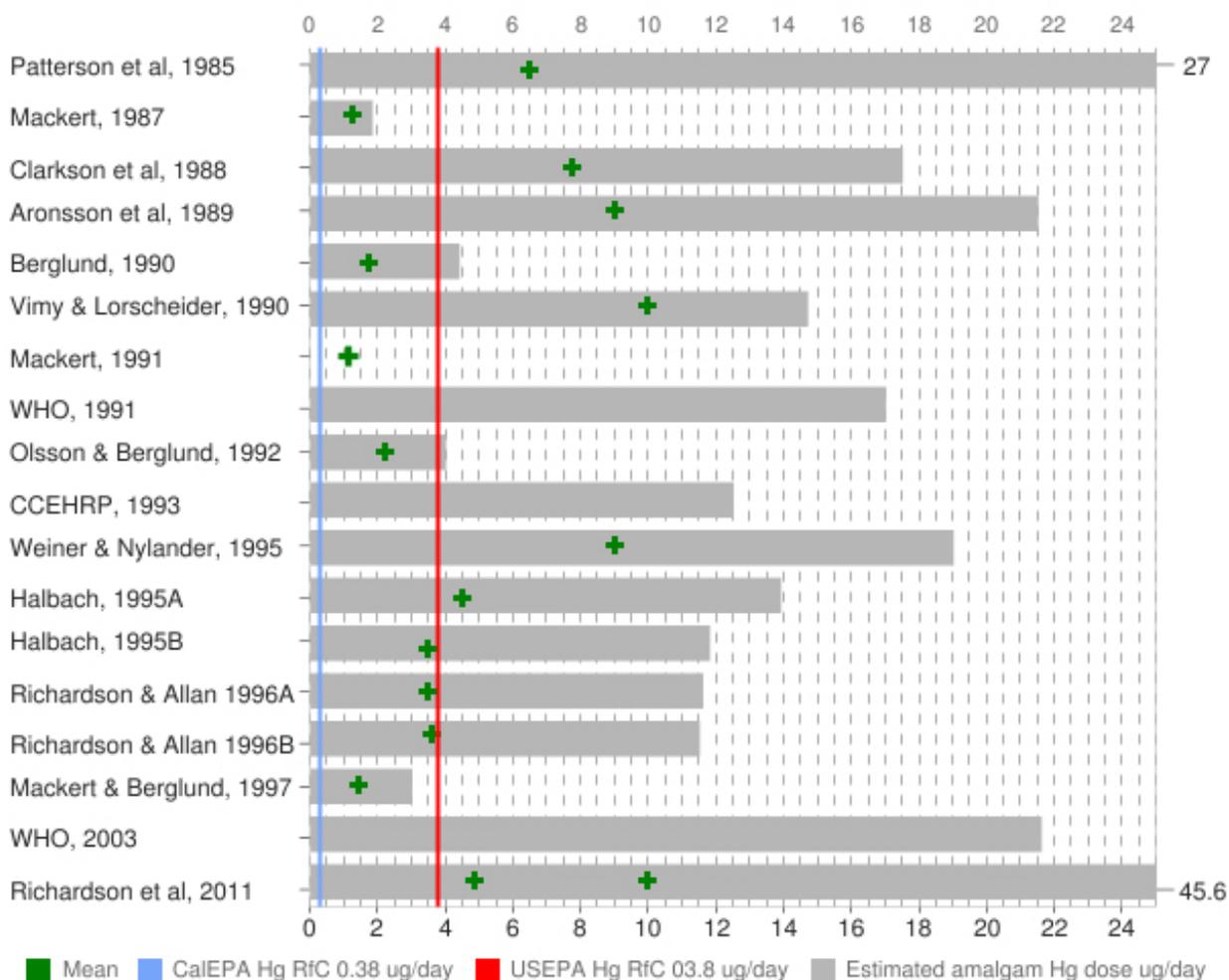
This table shows some mercury measurements taken from the scientific literature for various types of exposure to amalgam, and compares them to published safety limits.

| Maximum allowable Hg vapor, $\mu\text{g}/\text{m}^3$ | 6 amalgam fillings, mouth air, $30\text{-}120 \mu\text{g}/\text{m}^3$ | Opening a mixed amalgam capsule, $1000 \mu\text{g}/\text{m}^3$ | Dry drilling old amalgam fillings, $4000 \mu\text{g}/\text{m}^3$ |
|--|---|--|--|
| OSHA: 50 | 2X | 20X | 80X |
| EPA: 0.3 | 400X | 3,333X | 13,333X |

Published Estimates of Mercury Exposure

This graph represents 18 published estimates of the range of daily mercury exposure in adults who have amalgam fillings, as compared with the allowable limits established by various government agencies for non-occupational settings. Each gray bar represents the range of estimated exposure according to that study. The green cross is the mean. The red line represents the daily limit allowed by the US Environmental Protection Agency, and the blue line represents the limit allowed by the California Environmental Protection Agency. As you can see, most published estimates of amalgam-derived mercury exposure show a range exceeding those limits.

PUBLISHED ESTIMATES OF Hg EXPOSURE IN ADULTS WITH DENTAL MERCURY FILLINGS



Citation: Richardson, 2011

What the manufacturers say: an MSDS Overview

The United States Occupational Safety and Health Administration (OSHA) requires the provision of a Material Safety Data Sheet (MSDS) for any hazardous material that poses a threat to employees in a workplace. The purpose of the MSDS is to protect workers by supplying them with the most crucial facts about the hazardous material at their jobsite, such as the physical properties of the material, proper storage and handling techniques, known health risks and essential emergency procedures.

Thus, manufacturers of amalgam fillings must create these information sheets, and their MSDSs include disturbing evidence about the known dangers of using mercury in fillings. Here are a few highlights of the MSDSs from manufacturers of dental amalgam all over the world:

*And...what the Judge says: the Sixth Circuit Court of Appeals held in *Barnes v. The Kerr Corporation*, 418 F.3d 583 (6th Cir. 2005) that, although Kerr's dental amalgam warnings discussed only the dangers of mercury, the warnings applied equally to mixed dental amalgam.*

"Barnes, however, contends that the [MSDS] warnings were inadequate because they stated the dangers of mercury alone, but not of mercury combined with the other ingredients of dental amalgams. We find this argument unpersuasive for two reasons. First, the admonitory power of the warning would not be increased by a statement that mercury is also dangerous when used in conjunction with the other ingredients in dental amalgams. The warnings already state that the dental amalgams contain mercury, enumerate the physical ailments that can result from mercury exposure, and provide a list of precautions for minimizing the danger of exposure. They do not claim that the other ingredients neutralize the danger while the dentist is working with the product."

From Kerr Contour (CA, USA) and others...

- "This product contains mercury, a chemical known to the State of California to cause birth defects or other reproductive harm."



From Ana 90 Duett (Sweden)...

- "Mercury may accumulate in the body which may cause adverse health effects."

From Kerr Sybraloy (CA, USA) and others...

- “Mercury should not be allowed to enter sewers.”



From Goldsmith (NJ, USA)...

- “Repeated low exposure or very high single exposure can cause Mercury poisoning. Symptoms include tremors (shaking), trouble remembering and concentrating, gum problems, increased salivation, loss of appetite and weight, and changes in mood or personality.”
- “Mercury may lower sex drive.”

From Ivoclar Vivadent (NY, USA)...

- “Mercury can cause urinary problems, visual disturbances, tremors, salivation, stomatitis, loss of teeth, blue lines on gums or neurotoxic/nephrotoxic effects.”
- “Do not touch spilled mercury. Collect the mercury droplets using specialized mercury vacuum cleaner.”



From Original D Wykle (NV, USA)...

- “Separate work and street clothing. Store work clothing in special lockers. Showers to be taken before changing into street clothes. Provide pre-placement and periodic medical exams for those regularly exposed to mercury with emphasis

directed to CNS-central nervous system, skin, lungs, liver, kidneys, and G.I. tract.”

From OralloMagiCaps (Switzerland)...

- “Mercury: Poison by inhalation. Human gastrointestinal tract and central nervous effects.”

From Bethlehem Apparatus Company (PA, USA)...

- “Mercury is highly toxic, irritating and causes sensitization and neurological symptoms.”
- “Mercury causes severe, adverse health effects after chronic exposure to low vapor levels. Emergency response efforts must be directed to removal of all traces of this product.”
- “The principal target organ associated with chronic Mercury exposure via inhalation is the central nervous system. Such exposures lead to the development of ‘Erethism.’ This syndrome consists of subtle or dramatic changes in behavior or personality: depression, fearfulness, restlessness, irritability, timidity, and indecision. These psychic and behavioral characteristics are often accompanied by insomnia, drowsiness, headache, fatigue. In advanced cases, memory loss, hallucinations, and mental deterioration may occur.”



- “This product is reported to cause reproductive effects in humans. Impotence has been reported in over-exposed males. Women occupationally exposed have reported menstrual disturbances, reduced ovulation, and spontaneous abortions. Mercury is excreted in breast milk.”
- Pre-existing respiratory problems, dermatitis, central nervous system disorders, kidney problems, and liver dysfunction can be aggravated by exposure to this product.”
- “Mercury can be harmful or fatal to contaminated plant or animal life.”



From Ivensys (MA, USA)...

- “Chronic exposure appears more common than acute and is primarily associated with central nervous system damage which can be permanent (ex. paresthesia of the hands, lips, feet). Early signs of toxicity include weakness, fatigue, anorexia, weight loss, and gastrointestinal disturbances. If exposure levels are high, characteristic tremors of the fingers, eyelids, and lips occur with progression to generalized tremors of the entire body. Psychic disorders are noticeable and characterized by behavior and personality changes, increased excitability, memory loss, and depression.”



From Schein (England)...

- “To promote safe handling, each customer or recipient should (1) notify its employees, agents, contractors, and others whom it knows or believes will use this material of information regarding hazards or safety (2) furnish this same information to each of its customers for the product and (3) request its customers to notify their employees, customers, and other users of the product of this

information.”

from SDI (Australia)...

- “Toxic by inhalation.”

From SILMET (Israel)...

- “The number of amalgam restorations for one patient should be kept to a minimum.”



All of the above quotes are taken directly from the Material Safety Data Sheets. Find out even more by reading them for yourself...most of them are available online.

In the “fact sheet” prepared and published by the Academy of General Dentistry, dentists and their patients are informed that “[m]ercury in dental amalgam is not poisonous. When mercury is combined with other materials in dental amalgam, its chemical nature changes, so it is essentially harmless.” This statement is squarely at odds with the ruling of the Sixth Circuit Court of Appeals, which held that mercury remains toxic after it is mixed with the dental amalgam constituents (according to Kerr’s material safety data sheets.)