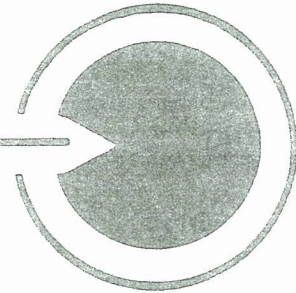


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DENTAL MERCURY - AN ENVIRONMENTAL HAZARD!

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As described at the end of this article The Swedish Health and Welfare Board (Socialstyrelsen) has announced plans for the "discontinuation of amalgam for environmental reasons." This action, taken at the direction of the Swedish government, supports a growing concern in the United States, over the proliferation of mercury in the environment along with its attendant harmful effects.

An Associated Press (AP) release dated 3 September 1992 was headlined "Study: Mercury-tainted fish is a widespread problem." The study AP was referring to was published August 1992 by the Clean Water Fund and Clean Water Action based in Washington, D.C. and titled *Mercury Warning: The Fish You Catch May Be Unsafe To Eat*. The study states that 26 states have issued health advisories in recent years. These warnings were issued because of high levels of mercury found in fish from numerous lakes and waterways. The most severe contaminations were in Florida, Michigan, Minnesota and Wisconsin. However, early testing in Maine and Massachusetts suggests that New England may have a serious

mercury problem as well.

In the past, chlor-alkali plants and timber processing facilities were blamed as the primary culprits for environmental mercury contamination. More recently, the finger has been pointed at coal-burning power plants and garbage incinerators. Still, the experts state that the available data do not fully explain the heavy contamination and admit uncertainty as to the prime culprit.

Once again, Sweden leads the way. The widespread nature of environmental mercury contamination suggests a more ubiquitous source than previously considered. The time has come to evaluate the contribution of dental mercury, widely used in the manufacture and implantation of "silver amalgam" dental fillings, to environmental contamination. To do so accurately, several avenues of contribution must be considered:

- Human excretions of mercury from dental amalgam.
- Dental office contribution to solid waste.
- Dental office contribution to wastewater.

HUMAN EXCRETIONS OF MERCURY FROM DENTAL AMALGAM

"Mercury levels of human excretions, in feces and urine, are of importance for the diagnosis of chronic mercury poisoning." So stated Stock and Cucuel in their 1934 article.¹ Now, approximately fifty-eight (58) years later, some attention is being given to that 1934 proclamation.

It has long been acknowledged that body mercury is excreted in the urine. However, the role of fecal mercury has been ignored. Fecal excretions contain mercury originating from food (methyl mercury and inorganic mercury), from amalgam restorations swallowed with saliva (inorganic mercury) and from previous intakes of mercury excreted with the bile.² Drs. Skare and Engqvist, of the Swedish

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National Institute of Occupational Health found the excretion of fecal mercury was on average about 20 times higher than urinary excretion when comparing individuals with the same number of amalgam fillings.²

With an average load of amalgam restorations considered to be 32 surfaces:

Excretion of total Hg via urine = 2.5 ug/24 hour.

Excretion of total Hg via feces = 63 ug/24 hour.

The sum of excretion equaled 60-70 ug/24 hour.

Professor Skare concluded his analysis of fecal mercury with the following statement:

"If the average fecal excretion was applied to the entire Swedish population, a total emission of 150 kg/yr (330 lbs/year) can be estimated. This is roughly comparable to the yearly mercury leakage from a modern chloralkali plant."

DENTAL AMALGAM MERCURY EXCRETION IN THE UNITED STATES

The National Data Book of the U.S. Department of Commerce estimates the total 1992 population to be 254,521,000.³ Approximately 20 million are under age 5, 46 million are ages 5-18, and 53 million over age 55. A 1985-1986 National Survey on the Oral Health of Adults (NIH) found that 15-16% of citizens over age 55 were edentulous.⁴ That leaves 180,306,000 dentulous adults over age 18 in the United States.

According to the 1985-1986 National Survey on the Oral Health of Adults, approximately 96% of the U.S. adults have restorations. The American Dental Association (ADA) states that 80% of all single restorations are amalgam.⁵ Therefore, in a dentulous adult population base of 180 million, those with amalgam fillings would represent approximately 144 million people.

A 1988 NIH publication determined that 50% of U.S. schoolchildren were free of decay.⁶ The same document found that 82% of the lesions were filled. This totals 18,860,000 children aged 5-18 with dental fillings (there are no available data to allow inclusion of the under age 5 group). Factoring an arbitrary 33% reduction for reduced body size (hence excretion volume) and the knowledge that 20% of fillings are not amalgam, adds about 10,000,000 to the total U.S. population with dental fillings, for a total of approximately 154,000,000 U.S. citizens with amalgam fillings. This represents 65% of the total population.

Using a conservative figure of mercury excretion of 60 ug/24 hours rather than the 60-70 ug/24 hours reflected in Professor Skare's study would total an excretion of 21.9 mg per person per year. This would translate to about 49.4 pounds (21.9 kg) of mercury for each one million people. Applying that

to the 154 million U.S. citizens with amalgam fillings, the **total annual excretion of mercury from urine and feces would be about 7608 pounds**, all of which goes directly into wastewater systems. That alone is a tremendous amount of mercury that is not even being considered by the government and environmental agencies concerned with the ever increasing pollution of our streams, rivers, and lakes.

Arriving at a precise number of pounds of mercury being dumped into the environment from this source is not the purpose here. Our intent is to point out, with supporting evidence, that a totally overlooked major contribution to environmental pollution is being made by the use of mercury in dentistry.

DENTAL OFFICE MERCURY CONTRIBUTION TO SOLID WASTE

According to the U.S. Bureau of Mines annual report, approximately 100,000 lbs (44 metric tons) of mercury per year are used by the dental profession.⁷ This is the amount used for the fabrication of new amalgam fillings. There are no hard data available to allow strict determination of what percentage of that amount is immediately discarded as the unused portion of scrap amalgam. Personal communication with dentists, however, indicates that amount to be 15% at the very least, which represents 15,000 lbs. To this total must be added the scrap amalgam routinely removed from traps (screens) in the dental operatory wastewater lines.

Although current hazardous waste regulations are causing a great deal more discipline in the disposal of scrap amalgam, for years it has been estimated that at least 50% of the dentists merely got rid of their scrap amalgam by dumping it in the trash.

A Seattle, Washington study encompassed roughly 1200 general practice (GP) dentists and estimated each dentist removes a mean of 17 amalgams per week and places a mean of 16 amalgams per week for 48 weeks per year.⁸ The study further estimated that about 130-150 pounds of mercury go to landfills annually and about 200 pounds are recycled. That would mean that the average GP dentist sends 0.125 lbs/Hg/year to the landfill and recycles 0.167 lbs/Hg/year. Bio-Probe must take scientific exception to this portion of the Seattle study. The development of the amount of mercury landfilled and recycled was based on the erroneous assumption that the average amalgam dental filling contains 200 mg of mercury. The dental materials textbook by Craig et al. states that the average amalgam fillings contains 780 mg of mercury.⁹ Statistical analysis of the total number of amalgam fillings placed and the total mercury consumed annually by the dental profession yields a figure of