DENTAL MERCURY - AN ENVIRONMENTAL HAZARD!
Sam Ziff and Michael F. Ziff, D.D.S.

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 bile.² Drs. Skare and Engqvist, of the Swedish
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.  

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. Approximately 20 million were 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. 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. 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. 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. 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. 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. Statistical analysis of the total number of amalgam fillings placed and the total mercury consumed annually by the dental profession yields a figure of
511 mg of mercury per amalgam filling (16 fillings per week x 48 weeks x 113,000 dentists = 86,784,000 amalgam fillings per year using 100,000 lbs of mercury). Utilizing a figure of 500 mg/Hg per amalgam filling, the filled and recycled data for the Seattle study would have to be increased by 250%. The corrected data for Seattle's 1200 GP dentists would show 0.3125 lbs/Hg/year/per dentist filled and 0.4175 lbs/Hg/year/per dentist recycled. The new totals for the Seattle area would be 375 lbs/Hg/yr filled and 501 lbs/Hg/yr recycled.

Utilizing the per dentist figure of 0.3125 lb/Hg/yr/filled, 113,000 general dentists in the U.S. dispose of 35,312 lbs of mercury in scrap amalgam as solid waste into landfills alone. (Subtracting 15,000 lbs of mercury that is scrapped from new amalgam from the total of 35,312 lbs, leaves 20,312 lbs of mercury, as the amount retrieved from dental office wastewater traps.)

DENTAL OFFICE MERCURY CONTRIBUTION TO WASTEWATER

In recent years it has become obvious that dental offices contribute significant amounts of mercury to wastewater systems. Every dental operating unit is equipped with an oral aspirating and evacuation system. Most have traps of some kind, that have a questionable efficiency by trapping only large particles of amalgam. The balance not stopped by the trap goes into the wastewater stream. Unfortunately, most dentists rapidly grind out old amalgam fillings, creating a "slurry" of amalgam particles mixed with water from the drill. Further, most dental offices clean out these traps only at day's end, allowing for leaching of mercury from the trapped particles into the wastewater throughout the day.

This concern has been addressed in several European countries, notably Sweden, Denmark and Germany. These countries now require more efficient mercury-separating equipment in dental office wastewater systems.

Pima County (Tuscon), Arizona has done some investigation of this aspect of environmental contamination and found that a large percentage of dental offices were discharging over the allowable limits of 0.05 micrograms of mercury per liter. Of the 73 mercury violations since 1985, dental offices violated the mercury limit 71 times and hospitals exceeded it twice. Several dental offices were temporarily closed until the problem was corrected.

The Seattle, Washington Study also addressed this issue and concluded that 1200 GP Dentists generate an average of 51 lbs of mercury per year into the wastewater stream. That amounts to an average of 0.0425 lbs/yr/dentist of mercury going into the sewerage system. According to the Seattle study sample analysis (Appendix B.) this amount going into the wastewater represents a total of only 23 milligrams of mercury from each amalgam removed. Utilizing the Seattle data of 0.0425 lbs/Hg/year/per dentist going into the wastewater stream, which we at Bio-Probe do not believe is accurate, 113,000 GP dentists in the U.S. would be dumping 4802 pounds of mercury per year into wastewater.

Since dental textbooks state that each average sized amalgam contains 780 milligrams of mercury, the Seattle study leaves 757 milligrams of mercury from each removed amalgam that is not delivered to the waste stream. If we use the much more conservative figure of 500 mg/Hg/filling as an average, this leaves 477 mg of mercury per amalgam filling being drilled out (17 fillings per week x 48 weeks) that is unaccounted for. For Seattle's 1200 GP dentists, this would amount to 1052 lbs of mercury per year (816 amalgams/year x 0.477 gm = 389 gm per dentist per year) not accounted for in their study. Does this represent the amount of mercury going into the air of the operator, into the patient, or into the trap, since only 23 mg/Hg per amalgam filling was found in the wastewater? According to the Laws of Physics, matter can be neither created or destroyed - so it has to be someplace!

If these figures are extrapolated to the approximately 113,000 dentists in the U.S. that place and/or remove amalgam, there would be 1,921,000 amalgam dental fillings per week drilled out to be replaced. This amounts to an annual figure of approximately 92,208,000 amalgam fillings drilled out for replacement each year. If we use the figure of 477 mg/Hg per amalgam filling being replaced as unaccounted for (92,208,000 x 0.477 gm), this would produce a gross amount of 98,915 pounds of mercury per year that is disappearing. If we then subtract the 20,312 lbs/Hg being recovered from the dental office traps, we are left with a net amount of 78,603 pounds of mercury per year disappearing out of peoples' teeth without ever being accounted for.

OTHER SOURCES OF DENTAL MERCURY ENVIRONMENTAL CONTAMINATION

Another aspect of mercury contamination that must be addressed is the amount of mercury released into the atmosphere from the cremation of deceased individuals with amalgam dental fillings. In Sweden, scientists have estimated that as much as 620 pounds of dental amalgam mercury are released into the atmosphere each year from cremation. This country has a population almost 32 times greater than Sweden and if the same ratio were to be applied, there would be 19,685 pounds of mercury
released into the atmosphere from cremation. However, the U.S. data do not support that type of analysis. The Cremation Association of North America stated that there were 400,465 cremations in the United States in 1991, and that this represented 18.5% of deaths.13 We have previously shown that the ADA estimates that 80% of all restorations are amalgam. Considering the percent edentulous and the percent without amalgams would result in amalgam bearers comprising 320,372 of the total. Utilizing an average of 8 amalgam dental fillings14 per amalgam bearer cremated (8 x 500 mg/Hg x 320,372), cremations would have contributed 2800 lbs of mercury to atmospheric pollution.

However, the number of cremations as a percent of deaths is going up each year. The Cremation Association estimates that the number of operating crematories in the U.S. will grow from the 1015 operating in 1991 to about 2600 by the year 2010 and the number of cremations as a percentage of deaths will climb to 27%.15 Applying that percentage to the projected 2010 U.S. population of 282,575,000 would indicate 7,629,525 cremations in the year 2010. Again allowing for edentulous and individuals with non-amalgam dental fillings, the total mercury released into the atmosphere from the cremation of 6,103,620 amalgam bearers will be 5,503 pounds.

What about the tourists to the United States. It is estimated that there will be 46 million people visiting the U.S. next year, all contributing some mercury contamination during their stay.

What contribution to environmental contamination do dental schools make? We were unable to find any data on this subject. However, we do know that at least one dental school in Japan was temporarily shut down because of the high percentage of mercury in the school effluent going into the wastewater stream. Evidently, mercury hygiene is not one of the more sterling qualities exhibited by most of the dental schools world-wide. For example, we are aware of one dental school in this country where the students were "protesting" to force better mercury hygiene and reduce their exposure.16

Another area contributing to the total would be higher than normal excretion of mercury by the individual after an amalgam filling is placed or drilled out. Limited data available indicates that there can be a substantial amount of mercury excreted in the feces and urine during the first week after placement or removal. When considered in the context of approximately 87 million amalgam dental fillings placed and 92 million amalgam dental fillings drilled out for replacement, that is 179 million procedures a year. If the total urine and fecal excretion for the week following placement or removal only increased 20% (420 mcg/wk/person x 20% = increase of 84 mcg/wk/person x 48 wks = 4.032 mg/per procedure/per year x 179 million procedures per year = 781,872,000 mg a year) that would mean an extra 1,627 pounds of dentally derived mercury per year not receiving any consideration.

The American Dental Association has convinced most dentists that there is no danger from mercury, i.e., the vapor will not cause any disease, and that if you swallow mercury whole, it will just pass out in your stool. For example the newspaper article describing the illegal dumping of mercury into treated wastewater in Pima County Arizona quoted the then president of the Arizona Dental Society as having stated "We dump amalgam....There is mercury in the amalgam, but it's OK to put amalgam in your mouth and it's OK to put in a landfill.11 As a direct consequence of this kind of mind set, the disposal of this poison has been very casual and undisciplined.

### SUMMARY

If we then add up some of the various factors of the environmental mercury contamination problem

<table>
<thead>
<tr>
<th>DENTAL MERCURY ACCOUNTED FOR WASTEWATER</th>
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<tbody>
<tr>
<td>Human excreta (urine/feces) = 7608 lbs/year.</td>
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<tr>
<td>Dental office effluent = 4802 lbs/year.</td>
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<th>SOLID WASTE</th>
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<td>Scrap amalgam = 35,312 lbs/year.</td>
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<td>Crematoria = 2,800 lbs/year.</td>
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**TOTAL CONTAMINATION = 50,522 lbs/year**

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<tr>
<th>DENTAL MERCURY UNACCOUNTED FOR</th>
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<tbody>
<tr>
<td>Mercury drilled out = 78,603 lbs/year</td>
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<tr>
<td>20% increased excretion = 1,627 lbs/year</td>
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**TOTAL UNACCOUNTED FOR = 80,230 LBS/YR.**

**COMBINED TOTAL = 130,752 LBS/YEAR**

Attributable to the use of this poisonous substance as a dental material in the United States, we find the following:

In evaluating dentistry's overall contribution to environmental mercury contamination, it is not necessary to go back to the beginning of its use in dentistry, over 150 years ago, but only to rationalize the disposal contamination considerations of the last 15 years. Using the summary figures above, the cumulative contamination from "accounted for"
dental mercury over the last 15 years beginning in 1977 would have been almost 758,000 pounds (50,522 lbs/Hg/yr x 15 yrs). However, if you utilize the combined total of accounted for and unaccounted for mercury, the total cumulative environmental contamination from dental mercury would have been almost 2,000,000 pounds (130,752 lbs/Hg/yr x 15 yrs).

Startled by the magnitude of the contamination? You should be! Over the last 15 years since 1977, the average population of the U.S. has been 236 million. We have previously determined that 65% of the population would have amalgam dental fillings. 65% of 236 million represents 153 million people that would be amalgam bearers with an average of 8 amalgam dental fillings each.\textsuperscript{14} 153 million individuals, each with 8 amalgam fillings containing 500 mg mercury would amount to (8 x 500 mg/Hg = 4 gm/Hg/person x 153 million) 1,379,448 pounds of mercury in the teeth of U.S. citizens at any one time. With the average life of an amalgam dental filling being 5 1/2 to 11 1/2 years\textsuperscript{17} it is not too difficult to understand that, although the dental profession is only using an average of 100,000 pounds of mercury per year, on any given day there is over one million pounds of available mercury implanted in the teeth of individuals that can be drilled out to further contaminate our environment.

What is the real significance of dental mercury contamination of our environment? Some major points brought out in the recent Clean Water Fund/Action Study\textsuperscript{18} are:

- Once mercury has been deposited in soil or water, bacteria can transform inorganic mercury into methylmercury.
- The principal cause of fish contamination in North America and Scandinavia is mercury. Over 90% of the total mercury in contaminated fish is methylmercury.
- Women of child bearing age are warned to avoid consuming mercury-tainted fish since methylmercury is readily transferred through the placenta to the developing fetus. (BP Note: So can mercury vapor released from amalgam dental fillings).
- At low maternal mercury levels, fetuses may develop cerebral palsy, physical deformity and mental retardation even if the mother exhibits no outward symptoms.
- Nursing mothers should avoid eating mercury contaminated fish since methylmercury can be transferred through mother’s milk to children with developing nervous systems. (BP Note: So can mercury vapor released from amalgam dental fillings).
- "A minuscule amount of mercury added to lake water can do a great deal of damage. Minnesota lakes with a tiny trace of mercury, contain fish with mercury levels that exceed the Food and Drug Administration’s (FDA) action level of one part per million. Mercury "biomagnifies" as it moves up the food chain. Larger fish near the top of the chain collect increasing amounts of mercury as they consume smaller organisms. Large predator fish can carry mercury concentrations in their flesh up to a million times higher than those found in the water."

"The potential of a small amount of mercury to damage a natural resource.

It would only take a pound of mercury pollution deposited each year to contaminate a lake with an area of 18 square miles with enough mercury to cause mercury fish levels to warrant fish consumption advisories.

Current deposition rates in Minnesota, where a large portion of lakes are covered by fish consumption advisories, are on the order of 10-15 ug/m²/year.

Assume a deposition rate of 10 ug/m²/year.

This means that 10 grams of mercury contaminates 1 square kilometer.

Since 1 lb = 454 g, the area that a pound per year can contaminate to levels associated with fish advisories is:

\[
454 \text{ g} \times 0.1 \text{ km}^2/\text{g} = 45.4 \text{ square km or about 18 square miles. This is a good sized lake (3 miles wide by 6 miles long).}\textsuperscript{18}
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Some other interesting points brought out in the study have a direct application to the dental mercury leaving the dental office in the wastewater stream or supposedly going to the landfill.

We say "supposedly" because about 20% of municipal solid waste is presently being incinerated and incineration is the fastest growing segment of garbage disposal/atmospheric mercury contamination.\textsuperscript{18}

Mercury effluent from dental offices passing through wastewater treatment facilities can be discharged as treated water directly into rivers and lakes; end up as a component of sludge that can be applied to soil as fertilizer or soil supplement which then has the potential to cause serious contamination of the aquatic ecosystems via runoff; or as sludge that will be incinerated, causing a large portion of the mercury in the sludge to be emitted to the air.\textsuperscript{18}

From a toxicological standpoint dental mercury is unique in the world of poisons. It is the only poison permitted to be directly implanted in humans and, in
this guise of a non-classified dental device, contaminates humans, our environment and food chain through its unapproved use in dentistry. The FDA has stated that they cannot classify dental amalgam because it is a "reaction" product mixed in the dentist's office. Consequently, every dentist in the United States implanting amalgam in the tooth of a patient is doing it illegally and without approval of the FDA in accordance with its own directives as published in the Federal Codes.

It is obvious from the data presented that dental mercury as an environmental hazard can no longer be taken lightly. No one can say with any degree of certainty what ecological disasters and attendant health problems have been caused by two million pounds of mercury going into our wastewater processing facilities, landfills, and incinerators over the last 15 years. When coupled with the ever increasing array of scientific literature demonstrating that the mercury vapor constantly being released from amalgam dental fillings has potential to do great human harm, the time for the FDA to declare an immediate moratorium on further use of mercury in dentistry, as advocated and recommended by the International Academy of Oral Medicine and Toxicology, is long overdue.

We are sure that these projections will be immediately attacked by the dental establishment and the Food and Drug Administration as being statistically and methodologically flawed. The answer is simple, show us your science that invalidates the premise and the information we have presented.

As stated at the beginning of our article on dental mercury as an environmental hazard, the Swedish Socialstyrelsen (Health & Welfare Board), as requested by the Swedish Government, has submitted a proposed five year plan for discontinuing the use of amalgam. Discontinuation is considered necessary because the release of mercury into air and water from dentistry is an increasing percentage of the total mercury released into the environment since contributions from other sources, e.g. batteries and thermometers has decreased. The basic rational behind taking five years to phase out the use of amalgam was the assumption that use of alternative materials would be so time consuming that it would require 700 more full-time dentists and would increase dental care costs by 1-1.3 billion Swedish Kroner.

The plan as submitted envisages:

1. Amalgam would not be allowed for use in primary teeth in children after July 1, 1993.
2. Amalgam in permanent teeth of children and youths up to 19 years of age (The age at which free dental care stops) would not be used after July 1, 1995.
3. Stopping the use of amalgam in adults was not considered possible prior to 1997.
4. Very stringent new regulations for the collection of scrap amalgam and the installation of amalgam filters to reduce the release of mercury from dentistry into the environment.
5. Education of dentists and staff in the use of alternative materials.

**BIO-PROBE COMMENT:** We understand that the plan as submitted is 145 pages long. Until we have had an opportunity to see all of the arguments and rationales for unnecessarily extending the phase out period for five-years, we are reluctant to comment at this time. For all those attending the IAOMT Annual Meeting in Pleasanton, California during Sept-25-27, 1992, Mats Hanson, Ph.D. of Sweden will make a short presentation of the Socialstyrelsen’s plan to phase out amalgam.

The important point to be made here is that the action directed by the Swedish Government relates to their very deep concern about the environmental issues involved.

**REFERENCES**

12. Health risks from exposure to mercury from crematoria. The Institute of Environmental Medicine, Karolinska Institute Report, IMM 192.
14. Vimy MF and Lorscheider F.L. Serial Measurements of intra-oral air mercury: Estimation of daily dose from dental amalgam J. Dent Res. 64(8):1073, Figure 2 and Table 1, 1985.
16. Personal communication Dr. Lane, Columbia University Dental School.
20. IAOMT Scientific Response To The ADA, May 1990.
ABSTRACTS/REVIEWS


ABSTRACT: A random sample of 100 men and 100 women was examined for whole-blood concentrations of mercury, lead, cadmium and selenium, and the serum concentrations of selenium, nickel, fluoride, aluminum, zinc and copper. Major predictors were sex, hormonal factors (pregnancy, menopause, use of oral contraceptives), age, tobacco smoking and alcohol drinking. Among notable associations, increased blood-mercury was related to the presence of more than four amalgam fillings in the teeth. Blood-mercury correlated with blood-selenium, but a relation to fish intake could only be demonstrated for the former parameter. In women, blood-lead appeared to increase with age, with the highest levels seen after the menopause. Serum-nickel was slightly lower in patients with nickel related contact eczema. Only the selenium concentrations showed a slight increase in individuals taking mineral supplements. Serum-zinc concentrations decreased considerably during the day. Thus, due to the substantial influence of physiological and environmental factors, individual results must be interpreted in the light of the known predictors for the trace element concentration. However, population-based reference intervals for trace elements in blood are useful to explore geographic and temporal variations. (P. Grandjean, MD, Institute of Community Health, Odense University, J.B. Winslows vej 17, DK-5000 Odense Č, Denmark)

BIO-PROBE COMMENT: To our knowledge, this is the first population type study that has taken into consideration the presence of amalgam fillings as a possible contributing factor. Contrary to ADA, FDA, and NIDR conclusions that amalgams do not contribute to blood mercury levels, this study demonstrates very conclusively that five or more amalgam dental fillings resulted in a statistically significant increase in blood mercury levels. This study provides additional corroboration to the existing science demonstrating that amalgam's significantly contaminate the human body with mercury. Another finding of this study was the fact that blood-mercury was significantly higher in women than in men. However, the authors could not explain or rationalize the sex-related difference.

One benefit of this study, if given wide dissemination within the medical community, could be a greater awareness among physicians of the necessity to consider amalgam dental fillings in assessing risk factors for individuals.

Unfortunately, because of all the confounding variables involved, it does not change the scientific conclusion that blood-mercury levels are not diagnostic of chronic-mercury toxicity. Stock and Cucuel in 1934 demonstrated this by doing blood-mercury analyses on a very diverse group of individuals. The group included men and women, young and old, work-related exposure and no work exposure, amalgam fillings and no amalgam fillings, toxic and not toxic. The results of all these analyses indicated that: 1) 1000 grams of human blood will normally contain a few micrograms of mercury and that 6-7 micrograms is still not unusual; 2) blood-mercury levels do not rise to any noticeable extent even when considerable mercury exposure occurs from mercury-containing air or amalgam fillings; 3) with stronger exposures, the mercury level of the blood can be elevated, but after cessation of exposure, it will soon drop to normal levels. Their conclusion was that for the diagnosis of mercury poisoning, blood-mercury levels were generally of little value. Although this particular point was recognized in public statements of the ADA and the NIDR in 1984, and no scientific evidence to the contrary has appeared since then, the ADA now states that blood-mercury levels are diagnostic of chronic exposure.

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ALZHEIMER'S UPDATE

David Snowden, an epidemiologist at the University of Kentucky, Sanders-Brown Center on Aging, is looking into the controversial question of whether amalgam dental fillings cause high levels of mercury in the brains of Alzheimer's victims. The cohort involved in the study will be 2600 Catholic nuns, members of the School Sisters of Notre Dame. Researchers will be concentrating on older, mostly retired sisters, ages 75 to 102, from Minnesota, Milwaukee, St. Louis, and Baltimore. Since 1990, Snowden has won more than $1 million in federal grants to continue his study for five years. The University of Kentucky has also received a five year grant of $760,000 to investigate a possible connection between Alzheimer's and amalgam dental fillings.

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Another exciting aspect of the Alzheimer's update is the recent discovery that acetyl-L-carnitine can slow the progression of the disease. In Italy, Dr. Spagnoli and his colleagues conducted a double-blind, randomized, controlled clinical trial using either 2 grams a day of acetyl-L-carnitine or a placebo. In a group of 130 Alzheimer's patients. 63 were given acetyl-L-carnitine and 67 were given a placebo. Those on the acetyl-L-carnitine supplement had a slower rate of deterioration and
had better logical intelligence, verbal critical abilities, long-term verbal memory and elective attention.1

Carnitine is an important amino acid made by the body from lysine. It exists in three measurable forms in blood: free carnitine, acyl carnitine and total carnitine. Supplementation with 3 grams of carnitine daily for ten days, raised the acetyl carnitine level in the blood by 80%. Supplementing with lysine can also raise carnitine levels.2

Interestingly, carnitine functions as a carrier of fatty acids across membranes of the mitochondria and as such one of its primary roles seems to be to regulate fat metabolism. The oxidation of fatty acids requires a reaction with thiols -SH to form fatty acyl-CoA and all subsequent intermediates in the fatty acid oxidation sequence are thioesters of coenzyme A.3

Perhaps more importantly, the mitochondria contains the highest sequence of sulfur bearing amino acids and it is well established that mercury binds avidly with sulfur molecules.

In the synthesis of carnitine from lysine, the presence of the amino acid methionine is required. A deficiency of methionine could also possibly lead to a deficiency of carnitine. Therefore, from a biochemical standpoint the ability of mercury to bind with sulfur molecules could decrease available methionine as well as interrupting fatty acid oxidation by binding with the thiol groups required to complete the oxidation or "fat-burning" energy producing cycle within the mitochondria. In many biochemical reactions, methionine also supplies a methyl group. Since carnitine contains three methyl groups, it may be methionine-sparing. Thus, increasing carnitine through diet or supplementation should reduce the need for the critical amino acid methionine. This presents a very interesting hypothesis as to why acetyl-L-carnitine benefits Alzheimer's patients. Certainly one that medical researchers and scientists need to evaluate further. Coherin, a product available from Cardiovascular Research, 1-800-888-4585 contains acetyl-L-carnitine. Your patients may purchase the product from L & H Vitamins in New York, 1-800-221-1152.


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ABSTRACT: Relationships have been established between the concentrations of mercury in human scalp hair and environmental or dietary mercury exposures. For chronic exposures, the hair/blood ratio for mercury is in the range 200:1-300:1, and scalp hair mercury concentrations of 5 ppm are indicative of mercury intoxication. These observations, coupled with the ease by which samples may be collected, transported and stored, support the use of hair analysis for evaluating mercury intoxication of the human body.

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The possibility that a subclinical deficiency of the trace element selenium might exist in a sample of the British population was examined by giving a selenium supplement for 5 weeks. The change in mood when taking the active tablet was correlated with the level of selenium in the diet, which was estimated from a food frequency questionnaire. Intake was associated with a general elevation of mood and, in particular, a decrease in anxiety. The lower the level of selenium in the diet the more reports of anxiety, depression, and tiredness decreased following 5 weeks of selenium therapy.

BIO-PROBE COMMENT: It is well documented in the scientific literature that some of the classic symptoms of mercury intoxication are mental depression, anxiety and fatigue. It is also well documented in the scientific literature that one of the protective systems, humans are endowed with, to combat exposure to xenobiotic heavy metal toxins utilizes the mineral selenium. Selenium binds with mercury to render it inert. Chronic exposure to mercury from amalgam dental fillings can and does reduce available selenium stores. That fact coupled the United States, would certainly suggest that the data presented in this study demands additional study. Mental depression, anxiety and chronic fatigue, without clear identification of etiological factors, affect millions of individuals in this country.

FORUM

Final call for the IAO Mont Annual Scientific Symposium. September 25-27, 1992 in Pleasanton, California. Meeting registration call Dr. Eccles (510) 352-5017. Rooms for IAO Mont provided at $90.00/day at the Pleasanton Hilton (510) 463-8000.

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The 15th National Dental Seminar on Homeopathy will be held Friday October 16-18, 1992 at The Oak Brook Hills Hotel and Conference Center in Oak Brook, IL. Basic Course $375.00; Advanced Course $350.00; Accompanying Spouses & Auxiliaries $75.00. Checks payable to: National Dental Seminar, P.O. Box 123, Marengo, IL 60152.