

Some salient facts about mercury, dental amalgams and health effects.

Submitted by ASOMAT (Australasian Society of Oral Medicine and Toxicology)

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1. Dental amalgams are NOT a true alloy. They are made up of 50% mercury which is NOT locked into a set filling, but escapes continuously during the entire life of the filling in the forms of vapour, ions and abraded particles. This release is stimulated by chewing, brushing and hot fluids. One study reported levels, of mercury vapour in the mouth, 54 times higher in the mouth of a patient with amalgams, after chewing, than the levels in the mouth of a patient without amalgams after chewing.
2. The absorption rate of inhaled mercury vapour is extremely high, approximately 80% of the inhaled dose, reaching the brain tissue within one blood circulation cycle.
3. The extreme toxicity of mercury is well documented. Current research is clearly demonstrating that inorganic mercury is just as toxic as organic mercury under various physiologic conditions.
4. The toxic threshold for mercury vapour has never been found. Even the US Environmental Protection Agency has so stated. The existing occupational standards are all specifically declared to be estimates only on the appearance of CLINICALLY OBSERVABLE SIGNS AND SYMPTOMS. Statements by the dental profession that the amount of mercury exposure encountered by patients from dental amalgams is too small to be harmful are contradicted by the scientific literature and are totally indefensible. Dentists receive no training at all which would enable them to even look for symptoms relating to mercury toxicity.
5. Controlled, broad-scale scientific studies investigating the effects on the health of patients of mercury released from dental amalgam fillings have NEVER been conducted. The true nature and full extent of effects are therefore unknown.
6. Mercury from amalgam fillings is stored principally in the kidneys, liver and central nervous system. This mercury has also been shown to cross the placenta and collect in fetal tissue. Studies show the level of mercury in liver, kidney and brain tissue of deceased Foetus, new-born and young children is proportional to the number of amalgam fillings in the mother's mouth. One such study concludes that "the elevated concentrations of inorganic mercury found in tissues of people with amalgam fillings, derive mainly from these fillings and not from other theoretically possible sources
7. Mercury from dental amalgam will also be transported across the breast milk of lactating women. In fact it has been demonstrated that breast milk increases the bio-availability of mercury to the newborn. Negative developmental effects have been shown (in animal models) in relation to these sources and concentrations of mercury.
8. The half-time for the elimination of a single dose of mercury is extremely long, certainly at least 30 days for the whole body and perhaps as long as 10,000 days for the brain. Multiple small doses will therefore result in body accumulation.
9. Sheep and monkey studies have confirmed that the mercury from dental amalgams enters and accumulates in the patient throughout the body, including the brain.
10. Human autopsy studies have shown that the concentration of mercury in the brain is directly related to the number, size and age of amalgam fillings in the mouth
11. Mercury has been shown to interfere with Tubulin synthesis resulting in "neurofibril tangles" in the brain. Mercury specifically from dental amalgam, placed in rats' teeth, has been shown to affect tubulin synthesis
12. Mercury from dental amalgams has been shown to be related to antibiotic resistance in the gut and oral cavity.
13. Both Health Canada (1996a) and the World Health Organization (1991) consider dental amalgam to be the single largest source of mercury exposure for the general public, with amalgam potentially contributing up to 84% (WHO, 1991) of total daily intake of all forms of mercury from all sources. Therefore, the level of exposure resulting from amalgam is not an issue of contention. The WHO also noted that for mercury vapour "a specific no-observed-effects level (NOEL) cannot be established i.e. NO level of Mercury Vapour has been found, that can be considered harmless.
14. Amalgam fillings have been associated in the scientific literature with a variety of problems such as periodontal problems (pyorrhea), allergic reactions, oral lichen planus, interference with the immune system as measured by the T-lymphocyte count, multiple sclerosis, fatigue, cardiovascular problems, skin rashes, endocrine disorders, eye problems. Blood mercury levels, significantly higher in amalgam patients than in non-amalgam patients, correlate with number and size of the fillings but return to normal when the fillings are replaced.
15. Claims by the Australian and American Dental Associations that the incidence of mercury allergy is less than 1% have never

cited any references. Such claims are totally refuted by the scientific literature. Published peer reviewed studies show allergic reactions range from 5%-8% (Nth Am Derm Gp) up to 39% (Miller et al)

16. The earliest symptoms of long term, low level mercury poisoning are sub clinical and neurologic. Consequently, due to their subtlety, these symptoms are easily misdiagnosed.

17. Some recent studies show that at least 50% of dentists with elevated mercury levels had peripheral nervous disorders and that dentists have twice the rate of Glioblastoma than non-dentists.

18. Research shows female dental personnel have twice the rate of infertility, miscarriage and spontaneous abortion than the rest of the population

19. Mercury from dental amalgams crosses the placenta, accumulating in the foetus, and is also transferred through the breast milk to neonates.

20. Wolf et al in 1983 in the journal 'Neurotoxicology' stated.." It is generally agreed that if amalgam was introduced today as a restorative material, it would never pass FDA approval "

21. The German and Norwegian Health Departments have directed their dental professions to NOT use amalgams in pregnant women and the German Health Department has also directed that children not receive dental amalgams either.

22. Canada Health, in the wake of the Richardson report, has stated similar views and has also added that people with kidney problems should not have amalgam fillings placed.

23. A report, "Dental Amalgams and Human Health, current position" commissioned by the New Zealand Health Department has just been submitted to the NZ Government. It concluded that in some circumstances some people could be adversely affected by dental amalgam fillings.

Based on the peer-reviewed scientific literature we are currently able to state the following.

- Mercury from dental amalgams is released from the fillings continuously and almost totally absorbed
- Mercury from dental amalgams accumulates in the tissues throughout the body
- Mercury from dental amalgams is very toxic and interferes with a variety of physiologic systems
- Physiological effects and health changes can be demonstrated by the placement and removal of dental amalgams
- There is evidence of health problems, related to mercury exposure, in the dental profession

ASOMAT's POSITION and CONCLUSION

It is ASOMAT's position that dental amalgams do NOT cause any particular disease or illness. Rather it is our view that dental amalgams promote heavy metal toxicity through a chronic and unrecognised accumulation of mercury in the body. ASOMAT believes that this is a medical problem with a dental cause and that this needs to be managed by the medical community. ASOMAT believes that recommendations which would stop or severely limit the use of dental amalgams in pregnant and fertile women, children, and those patients with kidney or neurological problems would be an appropriate and prudent preventive response based on the scientific literature of the moment. ASOMAT also believes that current alternative materials negate the previous need for amalgams, allowing an immediate phase out of amalgams over a 2-3 year period which would allow time for retraining of the dental profession and the teaching institutions. Training in the recognition of mercury toxicity is also necessary.

It is appropriate to end this summary with a statement from the National Research Council of the United States of America, which issued a report in 1978 entitled "An assessment of mercury in the Environment".

"Mercury compounds have no known normal metabolic function and their presence in the cells of living organisms, including human beings, represents contamination from natural and anthropogenic sources. In view of the toxicity of mercury and the inability of researchers to specify the threshold levels of toxic effects on the basis of present knowledge, all such contamination must be regarded as undesirable and potentially hazardous."

No information has come to light since the publication of this statement in 1978 which alters this view

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EXECUTIVE SUMMARY OF RICHARDSON REPORT

Executive Summary For Canadians with amalgam-filled teeth, it was estimated that total mercury (Hg) exposure averages: 3.3 ug Hg/day in toddlers (aged 3 to 4 years); 5.6 ug Hg/day in children (aged 5 to 11 years); 6.7 ug Hg/day in teens (aged 12 to 19 years); 9.4 ug Hg/day adults (aged 20 to 59 years); and 6.8 ug Hg/day in seniors (aged 60+ years). Of this exposure, amalgam was estimated to contribute 50% to total Hg exposure in adults, and 32 to 42% for other age groups. Estimates, based on two independent models, of exposure from amalgam alone were: 0.8 - 1.4 ug Hg/day in toddlers; 1.1 - 1.7 ug Hg/day in children; 1.9 -2.5 ug Hg/day in teens; 3.4- 3.7 ug Hg/day in adults and 2.1 - 2.8 ug Hg/day in seniors.

There are insufficient published data on the potential health effects of dental amalgam specifically to support or refute the diverse variety of health effects attributed to it. Numerous studies constantly report effects on the central nervous system (CNS) in persons occupationally exposed to Hg. Virtually all studies failed to detect a threshold for the effects CNS measured. A tolerable daily intake (TDI) of 0.014 ug Hg/kg body weight/day was proposed for mercury vapour, the principal form of mercury to which bearers of amalgam fillings are exposed. This TDI was based on a published account of sub-clinical (i.e. not resulting in overt symptoms or medical care) CNS effects in occupationally exposed men, expressed as a slight tremor of the forearm. An uncertainty factor of 100 was applied to these data, to derive a reference dose (TDI) which should, in all probability, prevent the occurrence of CNS effects in non-occupationally- exposed individuals bearing amalgam fillings.

The number of amalgam-filled teeth, for each age group, estimated to cause exposure equivalent to the TDI were: 1 filling in toddlers; 1 filling in children; 3 fillings in teens; and 4 fillings in adults and seniors. It was recognized that filling size and location (occlusal versus lingual or buccal) may also contribute to exposure. However, data suggest that no improvement in prediction of exposure is offered by any particular measure of amalgam load. Therefore, the estimates of exposure derived from the number of filled teeth were considered as reliable as those that might be based on size and position of amalgam fillings, were such data available for the Canadian population.

Effects caused by allergic hypersensitivity to amalgam or mercury, including possible auto- immune reactions, can not be adequately addressed by any proposed tolerable daily intake. Individuals suspecting possible allergic or auto-immune reactions should avoid the use of amalgam selecting suitable alternate materials in consultation with dental care (and possibly health care) professionals.

Preface This report has been prepared in response to concerns that exposure to mercury from dental amalgam may adversely impact on health. Recent reviews (USDHHS 1993, Swedish National Board of Health, 1994) have concluded that there is no evidence to suggest that dental amalgam, specifically, is injurious to health. However, the data base relating health impacts in humans or animals to amalgam specifically is small and weak. This suggests that indirect evidence relating mercury vapour exposure (the predominant form of mercury released by dental amalgam) to human health effects (for which a large data base exists) is a necessary basis for an evaluation of the possible health risks of dental amalgam. In the reports previously mentioned, exposure to mercury arising from amalgam was not adequately quantified, and a level of mercury vapour exposure which is, in all probability, tolerable to the vast majority of persons bearing amalgam fillings, was not defined. This report attempts to address these previous deficiencies.

This report is not exhaustive. Recent reviews on mercury (WHO 1990, 1991; IARC 1993; ATSDR 1994) adequately review many aspects of mercury toxicity and exposure. Instead, this report focuses on studies which report on health effects in dental care practitioners and other occupational groups exposed to relatively low levels of mercury. This report also examines recent research which hypothesizes a link between mercury exposure, and thereby dental amalgam, and Alzheimers' Disease. This report concentrates on effects associated with long term mercury vapour exposure (via inhalation) in humans. Other reviews (WHO 1990, 1991; IARC 1993; ATSDR 1994) examined acute and sub-chronic exposure in animals, and all aspects of the toxicology of exposure to other forms of mercury via other routes of exposure (ingestion, dermal absorption), in extensive and adequate detail such that this is not repeated here.

Any medical or dental material, such as amalgam, will have associated with it some degree of health risk. The purpose of this report is to attempt some determination of what that risk is (i.e. what effect(s) it may cause), how significant it is (i.e. what level of exposure should be free from effect), and what proportion of the population might be at some degree of risk (i.e. how many exceed the level considered to be free from effect)

Health Canada's Recommendations Concerning the Use of Dental Amalgam

(Health Canada, 1996a)

1. Non-mercury filling material should be considered for restoring the primary teeth of children where the mechanical properties of the material are suitable.
2. Whenever possible, amalgam fillings should not be placed in or removed from the teeth of pregnant women.
3. Amalgam should not be placed in patients with impaired kidney function.
4. In placing and removing amalgam fillings, dentists should use techniques and equipment to minimize the exposure of the patient and the dentist to mercury vapour, and to prevent amalgam waste from being flushed into municipal sewage systems.
5. Dentists should advise individuals who may have allergic hypersensitivity to mercury to avoid the use of amalgam. In patients who have developed hypersensitivity to amalgam, existing amalgam restorations should be replaced with another material where this is recommended by a physician.
6. New amalgam fillings should not be placed in contact with existing metal devices in the mouth, such as braces.
7. Dentists should provide their patients with sufficient information to make an informed choice regarding the material used to fill their teeth, including information on the risks and benefits of the material and suitable alternatives.
8. Dentists should acknowledge the patient's right to decline treatment with any dental material.

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