

group members, stimulating new and existing research projects, and promoting collaborative research efforts. Through this interchange, it hopes to establish many health systems researchers who can initiate and support health research in their own countries.

By systematically reviewing and analysing developments in health improvements within a clearly defined framework, the group seeks to avoid the pitfalls to which Banerji refers. In times when money is scarce, commitments shift, and technocratic solutions are most popular, this will not be easy. However, experience in comprehensive primary health care and the value of equity have proved a rich source for health care development. The Health Systems Research Group on Comprehensive Primary Health Care has begun to explore ways to make the relevance of such experience known to policy-makers and resource holders.

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Mercury exposure from "silver" fillings

SIR,—A "silver" amalgam tooth filling weighs 1.5–2.0 g, 50% being elemental mercury (Hg). Estimates of amalgam Hg doses absorbed daily range from 1.2 to 27 µg with a consensus average of 10 µg, and in individuals with many amalgam fillings the dose can be as high as 100 µg.¹ However, dentists insist that dietary Hg greatly exceeds amalgam Hg exposure. The Canadian Dental Association, in a Nov 20, 1990, letter to its members and the press, claimed that a daily dietary Hg intake of 2.44 mg is safe for an adult and that the average daily dietary Hg intake is 600 µg, 60 µg of which is absorbed. Such statements are seriously misleading, but they have been taken up in newspaper articles, radio interviews, television newscasts, and even journals,² all citing spokesmen for the Canadian and American Dental Associations claiming that amalgam Hg exposure is minuscule compared with dietary exposure. We have examined the basis for this assertion.

The estimated daily intake of Hg from air, water, and food (not including amalgam) averages 3.09 µg, 2.26 µg being absorbed. Of this absorbed total, 0.032 µg is Hg vapour, 0.065 µg is inorganic Hg, and 2.16 µg is methyl Hg. Food supplies a daily intake of only 0.6 µg inorganic Hg (0.060 µg absorbed) and 2.4 µg is methyl Hg (2.16 µg absorbed). Thus, the total daily Hg intake from food is only 3 µg of which 75% is absorbed.³ The Canadian Dental Association's advisers seemed to have erred by a factor of 1000 in interpreting published data on Hg intake from food. The claim that 2.44 mg is a safe daily intake is also absurd because continuous exposure at this level extrapolates to an equilibrium body burden of about 244 mg, which is six times the critical threshold known to produce overt Hg toxicity in adults.⁴ Both the consensus amalgam Hg daily dose (10 µg) and the more extreme 100 µg¹ are 4–45 times higher than the actual average Hg dose of 2.22 µg absorbed daily from food. This comparison illustrates why Clarkson and co-workers conclude that dental amalgam is the largest source of inorganic Hg exposure in the general population.⁵

The American Dental Association has stated that amalgam Hg exposure is insignificant compared with eating fish or seafood⁶ and that tuna fish salad is a far greater Hg source than fillings.⁷ The average fish-eating person in the US consumes 18.7 g fish per day, containing an average Hg concentration of 0.27 µg/g, yielding a daily Hg intake of 5.0 µg with a lesser amount being absorbed.⁸ The Hg dose is less than what many people receive from amalgam. The American Dental Association has also compared amalgam Hg vapour exposure to methyl Hg exposure from fish, using blood Hg levels.⁶ This approach is flawed because the blood half-life for elemental Hg vapour (3 days) and methyl Hg (50 days) differ significantly,⁹ in contrast to a whole-body half-life for elemental Hg (58 days)³ which is similar to that for methyl Hg (69 days).⁴ It is not the elimination of elemental Hg from the body that accounts for its 17-fold shorter half-life in blood, but the elemental Hg absorption from blood into other tissue compartments. This is confirmed by our findings in animals that amalgam Hg blood levels remain low, yet tissue Hg levels become very high.^{9,10} This suggests that blood

Hg is an unreliable diagnostic index of chronic low-dose Hg exposure from dental amalgam.

These data raise serious doubts about the reliability of statements from the Canadian and American Dental Associations. Experiments in primates clearly demonstrate that Hg released from "silver" tooth fillings concentrates in body tissues^{9,11} in amounts sufficient to alter cell function.⁹

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