Reviewer's report

Title: Dental amalgam and urinary mercury concentrations: a descriptive study

Version: 3 Date: 3 April 2013

Reviewer: Lars Bjorkman

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In the revised version the authors have included upper percentiles. This makes the paper much more informative. However, important aspects of the results are not discussed and there is still need for revisions.

1. Background, last paragraph: “The purpose of the present study is to determine the overall urinary mercury level in the Canadian general population, and to establish if there is a relationship between urinary mercury concentrations and the number of amalgam surfaces” and Trends: “For the selected percentiles, the urinary mercury concentrations increased with the number of dental amalgam surfaces.”

No results are presented from statistical analyses of the relationship between urinary mercury concentrations and the number of amalgam surfaces. Both linear and nonlinear relationships should be tested. An estimate of the proportion of the variance explained by the number of amalgam surfaces would be of interest.

2. Results, first paragraph: “All estimates accompanied by the letter “E” must be interpreted with caution due to high sampling variability; coefficient of variation 16.6% - 33.3%.”

The logic behind this is unclear. Is “high sampling variability” equal to large variance in the sample? Is uncertainty introduced by the bootstrap re-sampling method in small sub-samples? This needs to be explained.

Data should be presented both for the actual sample of 5,418 individuals and for the weighted data (representative for the Canadian population). A simple way to do this is to present graphs of the cumulative frequencies of mercury concentration in urine for the actual sample of 5,418 individuals using two separate curves in the same graph (one for individuals with amalgam and one for individuals without amalgam). Descriptive data representative for the sample of the 5,418 individuals will not be misleading, but very informative.

The weighted data as given in the present version of the manuscript could be presented in tables, instead of in the text in the Results section (see comment in Minor Essential Revisions section).

3. An estimate of the number of people in Canada who have values above 7 µg Hg/L urine (or 5 µg Hg/g Cr) should be calculated and presented in the paper.
Not mentioning that a considerable number of Canadians have levels of mercury exposure above levels expected to be safe (HBM-I levels) is to hide important information.

In addition, the reference “Mercury from dental amalgam: looking beyond the average” (by Barregard L, published in Occup Environ Med. 2005 Jun;62(6):352-3) should be cited and discussed in relation to data presented.

4. Conclusions: “…From a population health standpoint, dental amalgam is a safe restorative material with important advantages over other commonly used yet less researched restorative materials. Importantly, there are major trade-offs associated with discontinuing amalgam use, including fiscal impacts on current public dental care programming and exposure to other chemicals which themselves are considered environmental contaminants.”

These conclusions are not supported by data presented in the paper. The ICMJE (International Committee of Medical Journal Editors) has the following recommendation regarding conclusions in a paper: “Link the conclusions with the goals of the study but avoid unqualified statements and conclusions not adequately supported by the data. In particular, avoid making statements on economic benefits and costs unless the manuscript includes the appropriate economic data and analyses. …” (From http://www.icmje.org/manuscript_1prepare.html)

Minor Essential Revisions

1. Abstract: “…the 99th percentile was 7.34E µg Hg/L, and the 99.9th percentile was …” Remove “E” after “7.34” and elsewhere in abstract.

2. Abstract: “Overall, 99.1% of participants had urinary mercury levels below 7 µg Hg/L and 98.7 % of them had urinary mercury levels below 5 µg Hg/g Cr.” This does not make sense. If the 99th percentile was 7.34 µg/L then less than 99.1 percent have values below 7 µg Hg/L.

3. Methods/Data collection, second paragraph: “To measure urinary mercury concentrations, urine spot samples were collected. Laboratory analysis of environmental chemicals and creatinine was performed at the Centre de toxicologie du Québec (CTQ) of L'Institut national de santé publique du Québec (INSPQ), Québec City. INSPQ followed standardized operating procedures that were developed for every assay and technique performed in their laboratory.”

Describe methods used for analytical quality assurance of the analysis of mercury in urine and results from the quality control of the analysis of mercury in urine.

4. Background, 3rd paragraph: “It has been reported [9] that starting in 2008, Norway, Sweden and Denmark banned amalgam restorations due to their association with environmental mercury pollution.”
Amalgam is not banned in Denmark. (See the publication “Future Use of Materials for Dental Restoration” Report of the meeting convened at WHO HQ, Geneva, Switzerland 16th to 17th November 2009)

5. Results/Young adults 20-39 years old: “People in this age group with the largest number of amalgam surfaces (i.e., 46-65) had a mumc of 0.84 µg Hg /L, 95% CI (0.81 - 0.87) or 2.03 µg Hg /g Cr, 95% CI (2.030 - 2.034).” This is probably wrong.

6. Results/Women of Childbearing Age (16-49 years old): “The 95th percentile was 0.93E µg Hg/L, 95%CI (2.56 – 3.34), the 99th percentile was 7.34E µg Hg/L, 95% CI (0.41 -1.45).” This is obviously mixed up. Give data in tables instead of text (makes it easier for both authors and readers).

7. Discussion, 4th paragraph: “The high sampling variability reflects mercury ubiquity and its diverse metabolic pathways, which influence the uptake, distribution, accumulation patterns and excretion rates.”

Variation within the subgroups may be influenced by e.g. chewing habits (see Barregard et al. People with high mercury uptake from their own dental amalgam fillings. Occup Environ Med. 1995 Feb;52(2):124-8). This should be taken into consideration and included in the discussion.

8. Discussion, 7th paragraph: “According to the Canadian Dental Association, in the case of dental amalgam, the scientific evidence does not support the allegation that significant health risks are involved; had there been any such risks, they would have arguably been observed during the 150 years that this material has been in use.” Reference needed for this statement.

9. Discussion, 8th paragraph: “Importantly, dental amalgams are usually replaced with composite resin restorations, which are a source of BPA.” Reference needed.

10. Table 2 and 3: It should be added that data presented are weighed and recalculated to be representative for the Canadian population.

11. Table 2: Is it correct that Males in the group “46-65 Surfaces” had a mean of 2.55 (95%CI from 1.45 to 4.47), but for All in the same exposure group it is indicated that “Estimate not provided because of extreme sampling variability or small sample size”?

Level of interest: An article of importance in its field

Quality of written English: Acceptable
Statistical review: Yes, but I do not feel adequately qualified to assess the statistics.

Declaration of competing interests:
I declare that I have no competing interests