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Calvin Kagan

Alison Krywanczyk


Xingfu Liang

John Malcolm

Molly Rovin

See next page for additional authors

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Authors

Calvin Kagan, Alison Krywaczyk, Xingfu Liang, John Malcolm, Molly Rovin, Bianca Yoo, Bailey Zhao, Jan Carney, Razelle Hoffman-Contois, and Heidi Hales

Cremations, Dental Amalgams, and You

Kagan, C¹; Krywanczyk, A¹; Liang, X¹; Malcolm, J¹; Rovin, M¹; Yoo, B¹; Zhao, B¹; Carney, J¹; Hoffman-Contois, R²; Hales, H³

¹University of Vermont College of Medicine Burlington, VT; ²Vermont Department of Health, Burlington, VT; ³ Vermont Department of Environmental Conservation, Waterbury, VT

Introduction

In Vermont, cremation has increasingly become an alternative to interment of an intact body. Many of the bodies being cremated contain dental amalgams, which are commonly used by dentists to repair dental erosion and caries (cavities). They are an economical option for caries repair, and remain popular. Roughly one third of all caries fillings done in 2002 in the U.S. utilized amalgam⁷. Amalgam is a metal alloy containing as much as 50% mercury by volume, a metal that is a known toxicant¹. Dental amalgams, may constitute a source of low level, continual exposure for those with these dental devices in situ and may be released to the atmosphere upon cremation.

The goal of this project was to investigate:

1. The status of the scientific opinion on potential health effects that may be associated with having dental amalgams.
2. To help refine State estimates of potential mercury emissions from Vermont crematoria.

Methods

- A literature review was performed on:
 - Health effects associated with exposure to elemental mercury and mercury in general.
 - Individual exposure to mercury as a result of dental amalgam installation.
 - State of current scientific and medical opinion on the potential health effects of dental amalgams, and recommendations for their use.
 - How to effectively communicate risk to both physicians and patients.
- Surveyed several Vermont crematoria (n=9) to obtain estimates of annual activity and trends.
- Obtained 2008 State of Vermont Ambient Emissions Inventory for Mercury from the ANR, DEC, Air Pollution Control Division. We researched the algorithm used to derive an estimated emissions value from crematoria.

“Dental amalgam has been studied and reviewed extensively, and has established a record of safety and effectiveness.” - ADA

Results

- The known effects of mercury include neurotoxicity, kidney toxicity, damage to the gastrointestinal tract, and possible termination of pregnancy. There are also acute allergies to mercury¹.
- It is debated whether chronic mercury toxicity from amalgams plays a role in multiple sclerosis, fibromyalgia, chronic fatigue syndrome, Alzheimer’s Disease, and Parkinson’s Disease¹.
- The U.S. EPA has established a chronic Inhalation Reference Concentration (RfC) of 0.3 ug/m³ for elemental mercury⁹. Some estimate this may equate to 114-144 ug/day¹. The California Environmental Protection Agency has established a Chronic Reference Exposure Level (REL) of 0.03 ug/m³ of mercury³.
- On average, a person with amalgam is estimated to be exposed to 1-5 µg of mercury vapor per day².
- Studies suggest children with amalgams have significantly higher levels of mercury in their urine and hair samples (3.763 µg/g vs. 3.457 µg/g, P=0.019 for urine, 0.614 µg/g vs. 0.242 µg/g, P=0 for hair)³.
- There are 2-12 times more mercury in body tissues of individuals with dental amalgams by autopsy⁴.
- The brain tissue of individuals with more than 12 amalgams was found to have an average of 300 ng Hg/g significantly exceeding the non-toxic level of 0.02 -36 ng Hg/g⁴.
- Studies in Japan have not found increased mercury in the atmosphere around crematoria⁵, however studies in New Zealand have found increased levels of mercury in the soil surrounding crematoria⁶.



Figure 1 – There are at least 9 crematoria dispersed through the state of Vermont, which each perform between 300 and 1,000 cremations per year. Eight locations are shown here.

Table 1. Estimated total mercury emissions from crematoria in VT in 2008^a

Emission Factor ⁸	1.49 g/body
Cremation Activity	1,975 per year
Total Mercury Emissions from Crematoria	6.49 lbs. ^b

^a Data from Vermont DEC. ^b Total mercury emissions in Vermont from all sources is 208.5 lbs.

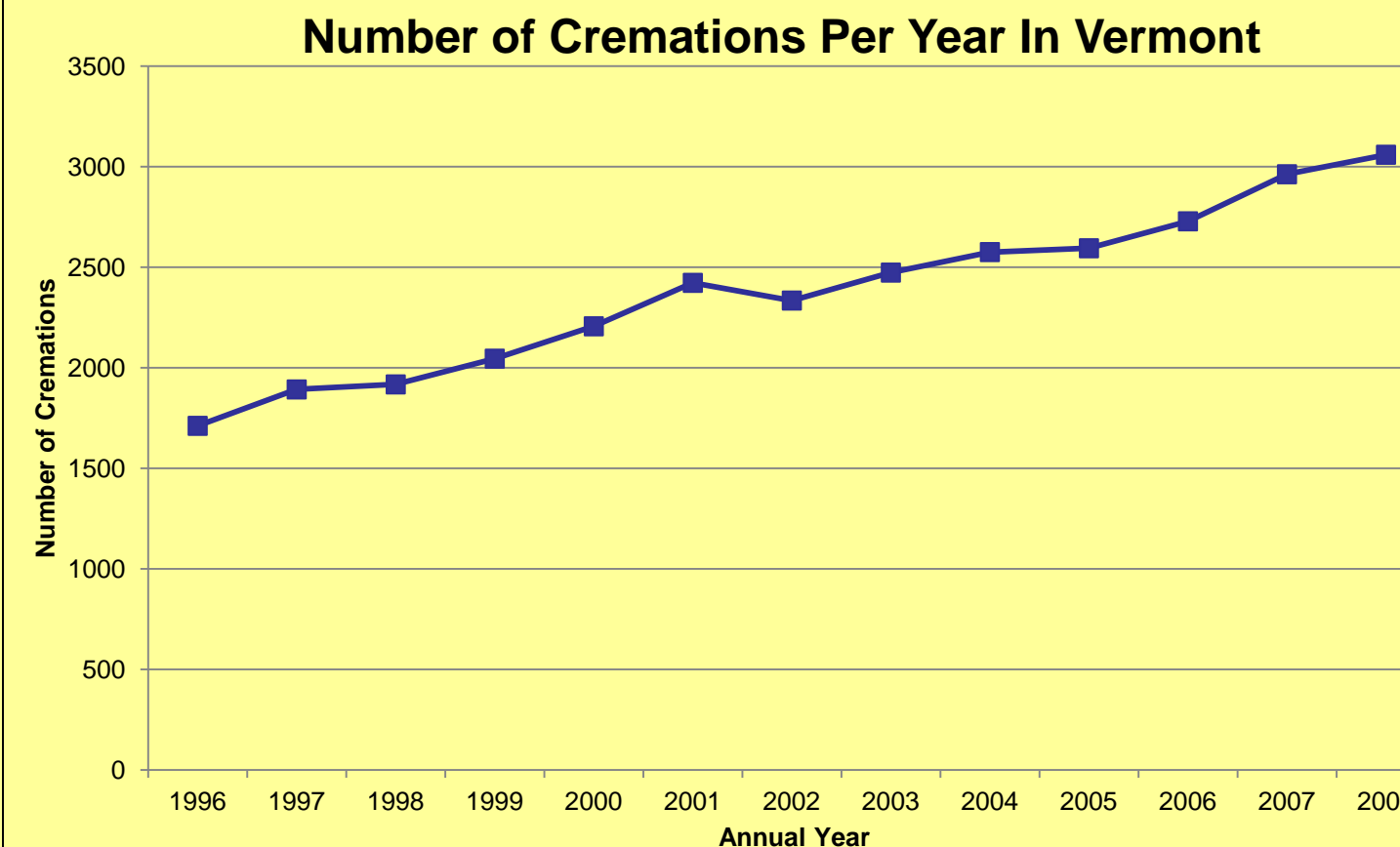


Figure 2 – There was a steadily increasing number of cremations per year in Vermont between 1996 and 2008⁷.

“...there is emerging consensus regarding the need to improve consumer education regarding dental amalgam and to better protect vulnerable subpopulations. There is also growing consensus to improve the care and consideration of patients who associate health symptoms with dental amalgam and the need to better educate the dentist and doctors who care for these patients.”

– FDA in 2010 Meeting of the Dental Products Panel¹

Discussion

- Studies have identified increased levels of mercury in the tissues of people with dental amalgams.
- It has been difficult to find a definitive method to measure mercury exposure in people with amalgams, and then to be able to compare studies that use different techniques.
- While mercury is a toxicant, it has been difficult for studies to find health effects significantly associated with dental amalgams. As shown, the FDA and the ADA have conflicting positions on the safety of dental amalgams.
- The trend of using cremation in Vermont is increasing. There is likely more mercury being emitted from crematoria than the 2008 DEC estimate indicates; the actual number of cremations in 2008 was higher than the estimate used in the algorithm. The estimate also does not account for where the emitted mercury is distributed, and the emission factor used is a national average.
- Many VT crematoria reported performing cremations for non-VT residents, and these cremations are not required to be reported. Thus the Vermont Department of Health Vital Statistics records may underestimate the number of cremations performed in VT, because they use VT death certificates to get their data.
- There is no actual monitoring being done of mercury emissions from crematoria in VT.

Conclusion

- Current studies of the safety of dental amalgams are limited by insufficient experimental designs and confined sample sizes. With increased understanding of mercury toxicity and improved experimentation techniques, researchers may soon validate that dental amalgams mildly increase the risk of pathology.
- We support the recommendations of the FDA, to not use amalgams in patients with known metal allergies and to discuss the risks and benefits with a dentist prior to amalgam insertion¹. It is crucial that patients are educated about possible health consequences before amalgam use, and are informed that current research is limited. Patients should also be made aware of alternative dental repair materials.
- The total number of cremations performed in VT should be monitored, as this information allow for an accurate determination of crematoria’s mercury emissions. We also encourage thorough analytical examination of crematoria to quantify the actual amount of mercury they release into the environment.

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