



October 29, 2009

## Water Fluoridation and Lead Toxicity

### I. Introduction

In January 2009, Public Health Madison and Dane County (PHMDC) released a policy statement addressing the fluoridation of public drinking water. Following a review of the medical literature and consultation with local and national experts, PHMDC determined that the available information supported the continued policy of water fluoridation at the current recommended levels (0.7 – 1.0ppm)<sup>1</sup>. Since the publication of this document, additional concerns have been raised by Madison residents about fluoridation of public drinking water; the vast majority focus on claims that water fluoridation may impact behavior and neurological development and increase lead exposure.

### II. Overview

Specific publications in the medical literature have associated drinking water fluoridation practices with increased risks of lead exposure and uptake. These studies further suggest that the increased bioavailability of lead and its increased absorption may ultimately result in increased levels learning disabilities, decreased IQ, attention deficit disorder, cocaine use, and violent crime among susceptible populations<sup>2-5</sup>. Although these reported outcomes appear troubling they are weakly supported and inconsistent. The authors report that water fluoridation increases the leaching of lead from brass fixtures such as faucets and meters resulting in the increased exposure noted by these investigations. However, a number of other chemical characteristics also increase lead release into water sources such as pH, natural organic matter, water hardness, oxidant levels, and type of piping; many these variables were not evaluated. Seasonally changes in temperature also influence the release of lead due to changes in pipe temperature in the ground, homes, and businesses<sup>6</sup>. Therefore, multiple collection points would be necessary in order to adequately examine the potential confounding impact of temperature and water chemistry on lead bioavailability. Lead absorption is also influenced by a number of factors including nutrition and lifestyle and behavioral choices such alcohol consumption and cigarette smoking<sup>6-8</sup>. In addition, childhood blood levels reported during screening efforts of high risk children in Dane County also does not support the association between water fluoridation and increased lead exposure. In the City of Madison and Dane County, the number of children screened for lead exposure has dramatically increased over the past decade while the number of children identified with blood lead levels of 10µg/ dL and above continues to drop. Currently, only 0.5% of all children (aged 12 to 72 months) screened for lead exposure have levels  $\geq 10\mu\text{g/ dL}$ ; the blood lead level that a response by PHMDC is required. For the proposed association to be supported the rate should either increase with increasing testing or stabilize due to the greater representativeness of expanded screening.

The association of water fluoridation with adverse behavior and learning deficiencies is also equally confounded. These investigations do not appropriately account for a large number of social factors including population dynamics, unemployment rates, historical crime rate trends, occupation exposures, diet, and socioeconomic factors that are routinely associated with higher risk for the outcomes the authors attribute to fluoride exposure<sup>5</sup>.

Following a careful review of pertinent scientific literature evaluating the above fluoride concerns, PHMDC has determined that the available information does not appropriately nor consistently support any potential association between water fluoridation and lead exposure, learning deficiencies, cocaine use, and/or violent behavior. Therefore, PHMDC continues to support the current City of Madison water fluoridation policy and does not find any basis for concern of its continuation

Prepared by: Jeffery S. Lafferty, MS, MSPH  
Environmental Epidemiologist  
Public Health Madison & Dane County

### III. References

1. Lafferty, JS, Hausbeck, J, Schneider, T, Schlenker, T. (2009). Fluoridation of public drinking water. Retrieved on October 27, 2009 from:  
<http://www.publichealthmdc.com/documents/FluoridationOverview200901.pdf>
2. Seavey, J. (2005). Water fluoridation and crime in America. *Fluoride*, 38(1), 11-22.
3. Masters, RD, and Coplan, MJ. (1999). Water treatment with silicofluoride and lead toxicity. *International Journal of Environmental Studies*, 56(4), 435-449.
4. Masters, RD, Coplan, MJ, Hone, BT, Dykes, JE. (2000). Association of silicofluoride treated water with elevated blood lead. *Neurotoxicity*, 21(6), 1091-1100.
5. Reeves, TG. (1999). Response to Masters and Coplan study water treatment with silicofluorides and lead toxicity. Retrieved on October 27, 2009 from:  
<http://www.cdphe.state.co.us/pp/oralhealth/fluoridation/fl-142.pdf>
6. Urbansky, ET, and Schock, MR. (1999). Can fluoridation affect lead(II) in potable water? Hexafluorosilicate and fluoride equilibria in aqueous solution. *International Journal of Environmental Studies*, 57, 597-637.
7. Pocock, SJ, Shaper, AG, Walker, M, Wale, CJ, Clayton, B, Delves, T, Lacey, RF, Packham, RF, Powell, P. (1983). Effects of tap water lead, water hardness, alcohol, and cigarettes on blood lead concentrations. *Journal of Epidemiology and Community Health*, 37(1), 1-7.
8. James, HM, Hilburn, ME, Blair, JA. (1985). Effects of meals and meal time on uptake of lead from the gastrointestinal tract in humans. *Human and Experimental Toxicology*, 4(4), 401-407.