Fact Sheet March 2011

COMMUNITY WATER FLUORIDATION: MYTHS AND FACTS

Myth: The pharmaceutical-grade fluoride (sodium fluoride) used in dentists' offices is the same kind that is used to fluoridate city drinking water.

Fact: Pharmaceutical-grade fluoride compounds are not appropriate for water fluoridation. The forms of fluoride used to fluoridate municipal water are fluorosilicates – hydrofluorosilicic acid (HFSA) or sodium silicofluoride.

Myth: Fluoridation additives are byproducts of the phosphate fertilizer industry.

Fact: Byproducts are simply materials produced as a result of producing something else – they are not necessarily bad, harmful or waste products. Fluoride additives are valuable byproducts produced as a result of producing phosphate fertilizer.

To ensure the public's safety, Canada has strict standards that must be met in order to fluoridate water. In Ontario, communities must obtain a license from the provincial government in order to operate a fluoridation system. Regulations for fluoridation are outlined in the *Ontario Fluoridation Act*, which includes continuous monitoring of fluoride concentrations. Ontario Environmental Protection personnel also conduct monthly analyses of fluoride levels.

Myth: Because of their origins, industrial-grade fluorides are contaminated with heavy metals such as arsenic, lead, mercury, cadmium, barium and radium, which are harmful to humans, animals and the environment.

Fact: It is recognized that heavy metals in certain quantities can be harmful to humans, animals and the environment. However, there are only minute traces of metals in fluoride additives and the levels are well below all current environmental protection standards.

Studies have found that water fluoridation is safe for the environment, and poses no risk to plants and animals.[1] [2]

Myth: Artificial fluoride not only contains lead, it also leaches lead from lead pipes, lead solder and leaded brass. The Environment Protection Agency lists many health problems caused by lead – including anemia, kidney damage and impaired reproductive function – and also suggests lead may be a carcinogen, causing kidney tumours and lymphocytic leukemia.

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[1] Pollick, ibid.

[2] Osterman, JW (1990). Evaluating the impact of municipal water fluoridation on the aquatic environment. *American Journal of Public Health*, 80(10): 1230-1235.

Fact: According to the U.S. Environmental Protection Agency and the National Association of Corrosion Engineers, corrosion is not related to fluoride. Corrosion by potable water is primarily caused by dissolved oxygen, PH, water temperature, alkalinity, hardness, salt, hydrogen sulphide and certain bacteria.[3]

Fluoride does not cause lead to leach from lead pipes, solder and leaded brass. A large scale study of blood lead concentrations in children in the United States who live in communities with water fluoridation found no support for the allegation that water fluoridation increases blood lead concentrations. Any associations were attributed to the age of the dwelling that the children lived in, which is a commonly known risk factor for lead exposure.[4]

Fluoride additives are required to meet rigorous standards of quality and purity before they can be used for water fluoridation. They dissociate very quickly and completely release fluoride ions into the water. Hydrofluorosilicic acid (HFSA) may contain minute amounts of contaminants such as lead and arsenic but the concentrations of these contaminants are well below the regulatory standards set to ensure the public's safety.

Myth: Several studies suggest that only a few years of fluoride ingestion from fluoridated water increases the risk for bone fracture.

Fact: The weight of scientific evidence shows that water fluoridation is safe and is not associated with an increased risk for bone fracture. A recent systematic review from the National Health and Medical Research Council (2007) which synthesized high quality research studies (randomized control trials, reviews and longitudinal studies) concluded that water fluoridation does not negatively affect bone fracture risk.

Most recently, in a study published in the *Journal of Dental Research* in September 2010 ("The Long-term Effects of Water Fluoridation on the Human Skeleton"), the authors concluded:

> …[C]ontributors to bone health are too many and varied, and any possible effect of municipal fluoride ingestion is too small, for municipal water fluoridation to be a significant determinant of bone health within the general public.

Myth: Excessive ingestion of HFSA during early childhood years may damage the tooth-forming cells leading to a permanent defect in the enamel known as dental fluorosis. And in November 2006, the American Dental Association (ADA) advised that parents should avoid giving babies fluoridated water.

Fact: Dental fluorosis only happens before teeth are fully formed. Most dental fluorosis is mild and barely visible to the untrained eye. The majority of dental fluorosis is caused when children swallow toothpaste, which contains thousands of times more fluoride than fluoridated water.

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[3] Howard Pollick (2004). Water fluoridation and the environment: A current perspective in the United States. *International Journal of Occupational and Environmental Health*, 10: 343-350.

[4] Macek, Matte, Sinks & Malvitz (2006). Blood Lead Concentrations in Children and Method of Water Fluoridation in the United States, 1988–1994. *Environmental Health Perspectives*, 114 (1): 130-134.

The optimal range of fluoride used for water fluoridation already has a built-in margin of safety that takes into consideration the use of fluorides from other sources. The math used to determine this number can be found in its entirety in the *Findings and Recommendations of the Review of the Expert Panel (January 2007):*

> Health Canada's population-based approach to drinking water guidelines based on the sub-population likely to be most affected (young children aged 22-26 months) remains most protective of all Canadians. (Joint Government of Canada Response to Environmental Petition No. 221)

Both the ADA and the U.S. Centers for Disease Control and Prevention advise parents and caregivers that it is safe to use fluoridated water to mix infant formula. If a child is exclusively consuming infant formula reconstituted with fluoridated water, there may be an increased chance for mild enamel fluorosis, but enamel fluorosis does not affect the health of the child or the health of the child's teeth.

To lessen this chance, parents and caregivers can use low-fluoride bottled water some of the time to mix infant formula; these bottled waters are labeled as de-ionized, purified, demineralized or distilled. Getting the right amount of fluoride is best – not too much and not too little.[5] Your dentist, pediatrician or family physician can help determine how to optimize your child's fluoride intake.

Myth: According to the U.S. National Research Council (NRC), risks of fluoride to health involve more tissues than just the teeth. Furthermore, fluoride has been linked to many adverse health effects, including kidney disease, thyroid problems, enzyme effect and bone disease, to name a few.

Fact: Fluorides in the level associated with water fluoridation do not cause adverse health effects. The overwhelming weight of credible scientific evidence has consistently indicated that fluoridation of community water supplies is safe and effective. Of the thousands of credible scientific studies on fluoridation, none has shown health problems associated with the consumption of optimally fluoridated water.

Claims of adverse health effects are based partly on one 1995 study by Mullenix et al. in which rats were fed sodium fluoride at levels up to 125 times greater than that found in optimally fluoridated water. The research conducted by Mullenix et al. has not been replicated by other researchers.

A seven-year study compared the health and behaviour of children from birth through six years of age in communities with optimally fluoridated water with those of children the same age without exposure to optimally fluoridated water. The results suggested that there was no evidence to indicate that exposure to optimally fluoridated water had any detectable effect on

[5] From the American Dental Association website: "Fluoride and Infant Formula: Frequently Asked Questions (FAQ)"

children's health or behaviour. These results did not differ even when data was controlled for family social background.[6]

Myth: Many people from fluoridated cities are exceeding the recommended daily intake putting them at an elevated risk of suffering toxic effects.

Fact: Factors such as age, body weight and dietary and fluid consumption are taken into consideration when determining recommended daily fluoride intakes. The recommended level of fluoride has a built-in safety margin that was calculated using the most vulnerable age group in the population (22-36 months) in order to be the most protective of all Canadians. Therefore, even when combined with other sources of fluoride, water fluoridation is still a safe and effective way to prevent dental decay.

Fluoride in the much lower concentrations (0.7 to 1.2 parts per million) used in water fluoridation is not harmful or toxic.[7] The amount of fluoride necessary to cause death for a human adult (155-pound man) has been estimated to be 5 to 10 grams of sodium fluoride, ingested at one time.[8] This is more than 10,000 to 20,000 as much fluoride as is consumed at one time in a single 8-ounce glass of optimally fluoridated water.[9] In other words, to obtain a fluoride level that could harm your bones, an individual would have to drink 10 to 25 litres (50 to125 cups) of fluoridated water at 0.8 parts per million per day for 10 to 20 years.

Myth: According to the U.S. Centers for Disease Control and the ongoing Iowa Fluoride Study, any benefit that accrues from the use of fluoride comes from the direct application of pharmaceutical grade sodium fluoride to the outside of teeth, not from ingestion of HFSA. There is no need, therefore, to expose all other tissues to fluoride by swallowing it.

Fact: Systemic fluoride (water fluoridation) is effective in providing a dental health benefit. When ingested, fluoride is deposited throughout the entire tooth surface through saliva and provides longer-lasting protection that when it's applied topically. Fluoride is also incorporated into the developing tooth enamel and strengthens it. A smoother tooth surface is created, which is more resistant to tooth decay and easier to clean. Systemic and topical fluorides work together to maximize reductions in tooth decay.

Myth: Ninety-eight percent of Western Europe has rejected fluoridation, yet they have had the same reductions of tooth decay as the fluoridated cities in the U.S. over the past 50 years.

Fact: No country has banned community water fluoridation. The decision not to fluoridate water does not necessarily mean that a city or country is against the practice; it has simply not been implemented for a variety of technical, legal financial or political reasons.

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[6] American Dental Association (2005). *Fluoridation Facts*.

[7] American Dental Association (2005). *Fluoridation Facts*.

[8] Hodge HC & Smith FA (1965). Biological Properties of inorganic fluorides. *Fluorine Chemistry*. Simons HH, ed. New York: Academic Press: 1-42.

[9] ADA (2005). Ibid.

In many areas in Europe, the water is naturally fluoridated at optimal levels or higher. Additionally, water fluoridation is not feasible for many areas because of the lack of a central water supply. This is why many European countries choose to fluoridate their salt or milk instead.

Fluoride supplements are also used in some European countries. Finally, most of Europe has socialized dental programs wherein all citizens get the oral health care they need and regular applications of fluoride are part of that oral health program.

***Myth*:** On January 7, 2011, the U.S. Department of Health and Human Services (HHS) recommended reducing the level of fluoride added to drinking water because it is too high – there is an increase in dental fluorosis in American adolescents, a sign of fluoride toxicity.

Fact: The Department of Health and Human Services has proposed adjusting the amount of fluoride in the drinking water to 0.7 mg/L to provide the best balance of protection from tooth decay while limiting the risk of fluorosis. The updated guidance is based on several considerations that include:

- Scientific evidence related to the effectiveness of water fluoridation on caries prevention and control across all age groups.
- Fluoride in drinking water as one of several available fluoride sources.
- Trends in the prevalence and severity of dental fluorosis. According to the HHS, dental fluorosis in the United States appears mostly in the very mild or mild form; incidences of severe dental fluorosis are rare.

The HHS continues to support appropriate fluoridation for community water systems, and its effectiveness in preventing tooth decay throughout one's lifetime.[10]

The ODA would like to acknolwedge the American Dental Association and the Thunder Bay District Health Unit in the development of this document.

[10] U.S. Department of Health and Human Services news release, "HHS and EPA announce new scientific assessments and actions on fluoride" (Friday, January 7, 2011)