



Q&A:

Community Water Fluoridation

What is fluoride?

Fluoride is a naturally occurring mineral found in soil, water and various foods.¹ It can also enter the environment through various chemical manufacturing processes.

How did water fluoridation begin?

In 1945, fluoride was added to water supplying four communities in the US and Canada after a long period of study of the effects of naturally occurring fluoride. These studies noted a dramatic decline in dental caries (decay) in cities with naturally occurring fluoride as compared with cities with low levels of fluoride.²

What is community water fluoridation?

Community water fluoridation is the process of adjusting the concentration of fluoride in community water supplies to a level that provides optimal dental benefits. Provincial and territorial governments regulate the quality of drinking water in their jurisdiction. Fluoridation of drinking water is a decision made by each municipality in collaboration with the appropriate provincial or territorial authority.²

What are the sources of fluoride?

Most of the fluoride that is added to community water sources is in the form of fluorosilicic acid, also known as FSA or HFS. This is a by-product of the process whereby phosphorite rock is used to manufacture phosphate fertilizer. During processing hydrogen fluoride and silicon tetrafluoride, gases are captured by vacuum evaporators and then condensed to a water based solution. It is this solution that is used in community water fluoridation programs.³ The Canadian Association of Public Health Dentistry (CAPHD) draws from positions taken, and evidence gathered, by other organizations;⁴ the *Report of the Fort Collins Fluoride Technical Group* states: "No evidence that adding fluoride increased contaminants in the water; changed the pH, or posed any health risk because of undissociated chemicals."⁴

Furthermore, this process ensures that no by-product or unhealthy part of fertilizer makes its way into the water system. It is noteworthy that fluoride occurring naturally in groundwater (calcium fluoride) contains the same fluoride ion as the fluoride in fluorosilicic acid.³

What is the optimal level of fluoride?

The maximum recommended amount of fluoride in drinking water according to the guidelines published by Health Canada² is 1.5mg/L. The currently recommended optimal concentration of fluoride¹ to promote dental health is 0.7 mg/L or 0.7 parts per million. This lower level of fluoride takes into consideration other sources of fluoride exposure, including toothpaste, mouth rinses and dental sealants. Communities who are reviewing or considering water fluoridation are encouraged to consider their individual circumstances taking into account other sources of fluoride,² including natural fluoride levels that may exceed the maximum recommended amount of 1.5mg/L.

Is water fluoridated in all provinces in Canada?

The Office of the Chief Dental Officer indicates that there is a wide range of usage of water fluoridation across Canada with an overall Canadian average of 45%. Usage is measured by per cent population treated. The estimated usage is as follows: British Columbia (4%), Alberta (75%), Saskatchewan (37%), Manitoba (70%), Ontario (76%) Quebec (6%) New Brunswick (26%), Nova Scotia (57%), PEI (24%), Newfoundland/Labrador (2%), Nunavut (0%), Northwest Territories (56%), Yukon (0%).⁵

Do all countries add fluoride to their water?

Not all countries add fluoride to the water supplies, but several have other fluoride programs. For instance, several western European countries have used different delivery methods including adding fluoride to salt. In countries such as Indonesia and areas in China where community fluoride is not technically feasible, community milk fluoridation programs exist as an alternative.⁶ Therefore, while not all countries add fluoride to their water, many have fluoride programs to improve the oral health of their populations.

Can water in rural communities be fluoridated?

Population density is a significant factor when considering community water fluoridation. Other important factors which affect the cost effectiveness of community water fluoride programs are the availability of equipment to transport, store and monitor the fluoride and the expertise of personnel.⁷ Therefore, the decision to add fluoride to community water systems is made at the municipal level in collaboration with the appropriate provincial/territorial authority.

What is the decay process?

Dental caries (cavities) are a lifelong disease and one of the rare conditions that affect Canadians at all ages.

Bacteria which live in our mouth metabolize dietary carbohydrates, in many foods and sugars, to produce acids. These acids dissolve the calcium and phosphate minerals of tooth surfaces; a process called demineralization. If demineralization continues over time it leads to dental decay.⁸

How does fluoride reduce caries (cavities)?

The most important effect of fluoride is that it protects tooth surfaces from acid attack (demineralization) and promotes remineralization (repair) of early caries lesions. The topical application or the constant supply of fluoride in the mouth is the most important factor in preventing dental decay. To a lesser extent, if fluoridated water is consumed while teeth are developing (childhood years), fluoride becomes incorporated into teeth to make them more resistant to decay.⁸

If I use a toothpaste with fluoride, why do I need fluoride in the water?

The combined use of fluoride toothpaste and fluoridated water offers protection above using either separately. Toothpaste has a higher concentration of fluoride, but while fluoride in drinking water is diluted, it comes in contact with your teeth every time you drink tap water or consume beverages or foods prepared with tap water. This provides your teeth with a continuous exposure to fluoride all day.³

Does fluoride only protect children's teeth?

The caries preventive effects of fluoride have been demonstrated not only in children, but in adults including people with physical or health issues who are not able to perform oral care adequately.

What are the adverse effects of fluoridation?

Dental fluorosis is the most widely and frequently studied of all adverse effects of fluoride.² Dental fluorosis is caused by the incorporation of fluoride into tooth enamel. It occurs in very mild, mild, moderate, or severe forms. However, very mild and mild dental fluorosis are not considered to be adverse effects, either from a health or from a cosmetic perspective, and that mild and very mild fluorosis is barely detectable, even by experienced dental personnel.²

The *Summary Report on the Oral Health Component of the Canadian Health Measures Survey* states, "So few Canadian children have moderate or severe fluorosis that, even combined, the prevalence is too low to permit reporting. This finding provides validation that dental fluorosis remains an issue of low concern in this country".⁹

Skeletal fluorosis is a severe side effect of excessive fluoride exposure which results in a weakening of the bone structure in the skeleton. It is caused by exposure to fluoride at very high concentrations of 10 mg/L (10 parts per million), and for long periods of time (e.g., ten years or more).² This can only occur when natural levels of fluoride are very high, i.e., almost 7 times higher than the maximum recommended exposure level¹ of 1.5 mg/L or 1.5 parts per million.

Can infant formula be prepared using fluoridated water?

All infant formulas have some fluoride at low levels. Therefore, parents can use fluoridated water for preparing infant formula. If parents have a concern about fluorosis, they can choose to use low fluoride bottled water some of the time.¹⁰

Does fluoride cause cancer or other diseases? Is it safe?

Water fluoridation has been used since the 1940s and has been extensively studied.⁶ Throughout this long history, a causal relationship between water fluoridation and overall health has not been found.⁶

Questions have been raised about the relation of fluoride to cancer, immunotoxicity, reproductive/developmental toxicity, genotoxicity and/or neurotoxicity and intelligence quotient. To date, no causal relationship has been demonstrated between fluoridation at recommended or optimal levels and any of these concerns.² It has also been suggested that there might be a relationship between osteosarcoma (a type of bone cancer) in boys and use of water fluoridation. At this time, there is no scientific evidence to support water fluoridated at optimal levels for health and the risk of any cancer, including osteosarcoma.¹¹

Why is fluoride added to water when it is available from other sources?

Adding fluoride to community drinking water is cost effective. Water sources are readily available and the costs of fluoridating water are inexpensive. In addition, water fluoridation is equitable and benefits the entire population on the water system regardless of their social or economic status.³

What are the public health benefits of water fluoridation?

Fluoridation of community water supplies has been called one of the top ten most significant breakthroughs in public health of the 20th century.³ Community water fluoridation is a safe, effective, and inexpensive method to reduce tooth decay among populations with access to public water systems and to reducing the heavy burden of dental decay worldwide.⁶

References

1. Health Canada. *Fluoride and Human Health*. 2010
<http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/environ/fluor-eng.php>
2. Health Canada. *Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Fluoride*. Federal-Provincial-Territorial Committee on Drinking Water. 2010.
<http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/2011-fluoride-fluorure/index-eng.php#tbl>
3. Centers for Disease Control. *Community Water Fluoridation: Questions and Answers*. 2011.
http://www.cdc.gov/fluoridation/fact_sheets
4. Canadian Association of Public Health Dentistry. *Fluoridation of Community Water Systems*. 2003.
<http://www.caphd.ca/sites/default/files/pdf/caphd-fluoridation-position.pdf>
5. Health Canada. Office of the Chief Dental Officer. *Provincial and Territorial Estimates for Community Water Fluoridation coverage in 2007*.
<http://www.hc-sc.gc.ca/ahc-asc/branch-dirgen/fnihb-dgspni/ocdo-bdc/project-eng.php>
6. World Health Organization. *Guidelines for Drinking Water Quality*. 2011.
http://www.who.int/water_sanitation_health/publications/2011/dwq_guidelines/en/
7. American Public Health Association. *Community Water Fluoridation in the United States*. 2008.
<http://www.apha.org/advocacy/policy/policysearch/default.htm>
8. Darby ML and Walsh MM. *Dental Hygiene Theory and Practice*. 3rd ed. 2010. p. 580.
9. Health Canada. *Summary Report on The Findings of the Oral Health Component of The Canadian Health Measures Survey, 2007–2009*.
<http://www.fptdwg.ca/English/e-documents.html>
10. Centers for Disease Control and Prevention. *Overview: Infant Formula and Fluorosis*. 2011.
http://www.cdc.gov/fluoridation/safety/infant_formula.htm
11. The Canadian Medical Association. *Community Water Fluoridation*. 2010.
http://www.cma.ca/index.php?ci_id=200754&la_id=1&q=cmmunity+water+fluoridation

Bibliography

Canadian Public Health Association. *Fighting the Good Fight: Fluoridation of Drinking Water*. 2011.
<http://cpha100.ca/12-great-achievements>

Association of Local Public Health Agencies. *Resolution: Fluoridation of Drinking Water*. 2011.
http://www.alphaweb.org/dental_health.asp

Canadian Dental Association. *CDA Position on Use of Fluorides in Caries Prevention*. 2008.
http://www.cda-adc.ca/files/position_statements/Fluorides-English-2010-06-08.pdf

Canadian Cancer Society. *Fluoride in Water*. 2011.
<http://www.cancer.ca/Ontario/Prevention>

American Dental Hygienists' Association. *Major Functions of Public Health have been Defined*. 2011.
<http://www.adha.org/publichealth/index.html>

American Dental Association. *Fluoride and Fluoridation*. 2010.
<http://www.ada.org/public/topics/fluoride/index.asp>

American Cancer Society. *Water Fluoridation and Cancer Risk*. 2010.
<http://www.cancer.org/Cancer/CancerCauses/OtherCarcinogens/AtHome/water-fluoridation-and-cancer-risk>

U.S. Department of Health and Human Service and the Environmental Protection Agency. *HHS and EPA announce new scientific assessments and actions on fluoride*. 2011.
<http://www.hhs.gov/news/press/2011pres/01/20110107a.html>

National Health and Medical Research Council. *A Systematic Review of the Efficacy and Safety of Fluoride*. 2007.
<http://www.nhmrc.gov.au/guidelines/publications/eh41a>

World Dental Federation. *Promoting Dental Health through Water Fluoridation*. 2008.
<http://www.fdiworldental.org/oral-health-through-fluoride>

McDonagh MS, Whiting PF, Wilson PM, Sutton AJ, Chestnutt I, Cooper J, Misso K, Bradley M, Treasure E, and Kleijnen J. Systematic Review of Water Fluoridation. *BMJ*. 2000;321(7265):855–859.
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC27492/>