

Alberta Health

Position statement on community water fluoridation

July 3, 2014

Alberta Health and Alberta Health Services recognize that community water fluoridation effectively prevents and reduces tooth decay, especially among people who are at greater risk. It offers significant benefit and very low risk, and reaches all residents who are connected to a municipal water supply. Community water fluoride is a foundational public health measure for prevention of tooth decay and to improve oral health.

Background

Community water fluoridation (fluoridation) is the practice of adding or removing fluoride from drinking water to optimal levels that are safe and will achieve the desired health benefits. In Alberta, municipalities have the responsibility for deciding on water fluoridation in their community. Municipalities may look to senior levels of government and health authorities for guidance on the decision to add fluoride to drinking water. A great deal of research about fluoridation exists; most evidence supports the benefits, but it can be confusing and daunting to thoroughly review. Improper and non-systematic selection of single reports may lead to inconclusive results and unsupported decisions.

Drinking water always contains fluoride, sometimes at natural levels sufficient to reduce tooth decay. Fluoridation is a method of imitating nature by adding or removing fluoride to obtain optimal levels in a community's water supply. Fluoridation began in Canada in 1945 and early results showed a 39% reduction in decay among primary teeth and a 53% reduction in decay for permanent teeth; all at a cost less than 20 cents per person per year¹. Further, dental care costs shrank significantly for children born in fluoridated communities after fluoridation began². These and similar findings from around the world led to initiation of fluoridation in many Alberta communities. The effectiveness of water fluoridation has been documented in scientific literature for well over 65 years. Fluoridation continues to be effective in reducing tooth decay in adults and children, even in an era with widespread availability of fluoride from other sources, such as fluoride toothpaste.

To better understand the overall spectrum of evidence, an appropriate world-wide systematic review was completed in 2000³ and updated in 2007⁴. Additional research continues to accumulate⁵ and Alberta Health and Alberta Health Services continue to review the evidence on community water fluoridation and to adapt provincial recommendations accordingly.

Description of issue

Many Alberta communities do not fluoridate their water supplies. In 2011, Calgary voted to discontinue fluoridation and Medicine Hat has never fluoridated water supplies. Even though fluoridation is a safe and effective practice, a large portion of Albertans do not have fluoridated drinking water.

More than 56% of 6–11 year-old children, and almost 96% of adults have experienced tooth decay⁶. Poor oral health affects the wellbeing of millions of Albertans while costing money and time off from school and work. Reducing tooth decay benefits everyone by minimizing the need for fillings, replacements and emergency care. Fluoride reduces decay by making teeth more resistant to demineralization, and by helping to remineralize teeth if decay has started. Water fluoridation promotes continuous low levels of fluoride in the mouth – the primary mechanism for its preventive action.

Despite strong support by the majority of health professionals, some people are opposed to fluoridation. A number of hypotheses propose that fluoridation contributes to various diseases. Reviews of the evidence

do not support these hypotheses. Opponents of fluoridation usually raise the issues of effectiveness, safety, dental fluorosis, and ethics.

This document provides a clear statement of support for community water fluoridation and outlines the current rationale for supporting it in Alberta.

Rationale for fluoridation

Dental caries cause irreversible damage to teeth, often leading to pain and infection. It is more prevalent among disadvantaged people who do not have financial resources to receive oral care. Teeth affected by tooth decay and which have been restored by a dentist usually require additional expensive retreatment and repair over the years. Dental care cost Albertans \$1.45 billion in 2010; more than 8% of that, about \$390 million, was publicly funded⁷. As a community problem that costs taxpayers money and affects the wellbeing of Albertans, oral disease is an urgent problem that needs to be addressed. Preventing the disease is the best option.

Effectiveness

Studies show fluoridation continues to be effective in reducing tooth decay even in an era with widespread availability of fluoride from other sources, such as fluoride toothpaste. On balance, comparisons consistently show fewer cavities in communities where the drinking water has optimal levels of fluoride.

- a. The original 2000 systematic review from York University (UK) included 26 studies on effectiveness and found the best available (Level B) evidence showed fluoridation was associated with⁸:
 - i. approximately 15% more children totally free from tooth decay
 - ii. an average of two fewer decayed, missing or filled teeth per child.
- b. The US 2002 systematic review of 36 studies concluded that there is “*strong evidence that water fluoridation is effective in reducing the cumulative experience of dental caries within communities*”⁹.
- c. The Cochrane systematic review of 74 studies of fluoride toothpaste concluded that fluoridation provided a benefit over and above that of toothpaste alone¹⁰.
- d. A 2007 meta-analysis of 20 studies found that fluoridation prevented 27% of tooth decay in adults¹¹.
- e. Some recent single reports echo the systematic reviews:
 - i. A 2009 report from New Zealand indicated that children, adolescents and adults living in fluoridated areas had significantly less lifetime tooth decay than those in non-fluoridated areas¹²
 - ii. In 2010 the average adult living in BC (3.7% fluoridated) had 29 - 44% more decayed, missing or filled teeth than an adult in the rest of Canada (45% fluoridated)¹³
 - iii. A 2010 research report from Nevada showed that children living in a fluoridated county were more likely to have never had a cavity, compared to children in non-fluoridated counties¹⁴

- iv. A 2010 Saskatchewan survey found that students attending schools in fluoridated areas had fewer cavities than children in schools without fluoridation¹⁵
- v. A 2011 research report of 348 children in Alaska found that those living in non-fluoridated communities had a 32% higher rate of decayed, missing or filled teeth than children living in fluoridated communities¹⁶
- vi. A 2013 report from Australia found that fluoridation consistently reduces cavities by 21 – 30% in adults¹⁷
- vii. A 2014 report from England found that children and adults in fluoridated areas had significantly lower tooth decay rates, and 45% fewer hospital admissions of children aged one to four for tooth decay (usually tooth extraction under general anaesthetic). The report found no evidence that water fluoridation has an effect on general health: no differences in rates of hip fracture, osteosarcoma, overall cancer rates, Down’s syndrome births, or ‘all causes’ of mortality¹⁸.

Safety

Fluoridation is safe and fluoridation offers a significant benefit and low risk.

Fluoride is a natural component of all drinking water. Some natural water supplies contain levels of fluoride that are too high and could result in dental fluorosis, a discoloring of the teeth. To address this, Health Canada has developed a Maximum Acceptable Concentration of fluoride in drinking water of 1.5 parts per million (ppm) expressed in mg/L. This is the maximum level of fluoride in water at which Health Canada recommends for everyday use. Some drinking water has very low levels of fluoride and these require the addition of fluoride to obtain health benefits. Health Canada recommends the addition of fluoride to an optimal level of 0.7 ppm for fluoridation programs. In Alberta, fluoridation programs are required to use the optimal level, which is monitored closely.

Science is not infallible and the consensus may change as new evidence emerges. Since there is so much research available, the best approach is via reviews of multiple reports.

- a. Some individual studies suggested a link between water fluoride and negative effects such as lower IQ levels, cancer and bone problems. The York 2000 systematic review considered 214 studies on the safety and efficacy of water fluoridation; 88 concerned side effects other than dental fluorosis. The review included “*all studies showing any negative effects from water fluoridation in humans*”. They found no association with water fluoride and adverse effects such as cancer, bone fracture and Down’s syndrome.
- b. Australia’s 2007 review update found insufficient evidence to reach a conclusion; a detailed review on bone fracture risk showed fluoridation has little effect, either protective or deleterious.
 - i. A 2013 report from Sweden also found that drinking water fluoride has no effect on hip fracture¹⁹
 - ii. A 2014 report found that fluoride exposures at the typical levels for adolescents in fluoridated areas do not have significant effects on bone mineral content measures²⁰.
- c. Health Canada’s Expert Panel review of fluoridation examined “*all identified human health risks, taking into account new studies and approaches*” including a literature review and total diet study. The 2010 report found that fluoride in drinking water up to twice the recommended

amount is unlikely to cause adverse health effects, including cancer, bone fracture, immunotoxicity, reproductive/developmental toxicity, genotoxicity, and/or neurotoxicity. A fluoride level of 0.7 mg/L in drinking water prevents excessive intake of fluoride through multiple sources of exposure.²¹ This level is 41% lower than the original recommended fluoridation levels (up to 1.2 mg/L) used in the 1950s and 1960s.

- d. In 2011 the European Commission's critical review of new evidence on the hazard profile, health effects, and human exposure to fluoride found²²:
 - i. The weight of evidence did not substantiate adverse health effects such as carcinogenicity, developmental neurotoxicity and reproductive toxicity
 - ii. Exposure of water organisms to fluoridated water is not expected to lead to unacceptable risks to the environment
 - iii. The fluoridation additive H_2SiF_6 rapidly hydrolyzes in water and acts as if fluoride is naturally present in the water. Any slight impurities in the additive are at least 100 times less than drinking water guidelines established by the World Health Organization and are not regarded as a health risk.
- e. Fluoride concentrations in drinking water are closely monitored to ensure they remain at optimal levels. The Government of Alberta:
 - i. Participates in developing Canada's Drinking Water Guidelines which define the appropriate levels for fluoride in safe drinking water
 - ii. Assists municipalities that have naturally high levels of fluoride (>2.4 mg/L) to reduce or switch to alternative water sources with levels no greater than 1.5 mg/L
 - iii. Has legislation that requires ongoing monitoring of added and naturally occurring fluoride in community water supplies.

Risk – dental fluorosis

In Canada, the prevalence of dental fluorosis of cosmetic concern is minimal; and so few Canadian children have moderate or severe fluorosis that, even combined, the prevalence is too low to permit meaningful reporting²³. This finding provides validation that dental fluorosis remains an issue of low concern in Canada.

Water fluoridation increases the risk of dental fluorosis – a discolouration of the tooth that occurs before it erupts. In the absence of fluoride from toothpaste or supplementary sources, about 10% of children drinking fluoridated water may develop very mild dental fluorosis (small whitish areas covering less than 25% of the enamel)²⁴. Most people with very mild dental fluorosis are unaware; it is barely noticeable to the untrained eye and does not affect health. Although fluoridation slightly increases the risk of dental fluorosis, Alberta surveys have not shown any significant differences in children's dental fluorosis levels between fluoridated and non-fluoridated areas. Surveys in Australia²⁵ and New Zealand²⁶ similarly found no significant differences in dental fluorosis between fluoridated and non-fluoridated areas.

Ethics

The ethical justification for fluoridation depends on the benefit to public health. Democracies work to preserve individual choice when possible, but exceptions exist if there is a significant benefit to the broader community. Inequalities in dental health may be reduced by preventing the disease. Fluoride

toothpaste alone will not reduce inequalities in oral health because its use depends on individual behaviour and personal cost.

- a. Quebec's 2012 ethics review of fluoridation found that the benefits of fluoridation outweigh its potential negative effects and that such benefits justify impinging on the freedom of choice of people who do not wish to have their water fluoridated²⁷.
- b. In a 2003 Section 7 Charter of Rights and Freedoms analysis, the Supreme Court of British Columbia dismissed an applicant's claims for damages for personal injuries resulting from the fluoridation of public water. The Court determined that adding fluoride (a naturally occurring substance in water) was different than adding a drug or medication that did not naturally occur. Fluoridation at optimum levels was a minimal intrusion into a person's right to liberty and security of the person. On appeal, the British Columbia Court of Appeal found that the evidence of the respondents amply supported the findings of the trial judge and the appeal was dismissed.²⁸
- c. In 2007 the Nuffield Council on Bioethics (UK) advised that the reduction of ill health and reduction of health inequalities, especially among children, make fluoridation justifiable when balanced against the principles of avoiding coercive interventions and minimizing interventions in personal life²⁹.

Different people with different perspectives may disagree about fluoridation. A 1998 Ontario review suggested that the controversy over fluoridation may be unresolvable³⁰. In similar cases many people look to elected representatives in government for guidance.

Conclusion

The best available scientific evidence supports fluoridation as an effective and safe public health measure to improve oral health and reduce dental carries. Alberta Health and Alberta Health Services monitor emerging research and information about fluoridation to ensure that recommendations reflect the best information available. Alberta Health values the oral health of Albertans and supports fluoridation as a public health approach to minimize dental disease and related complications.

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