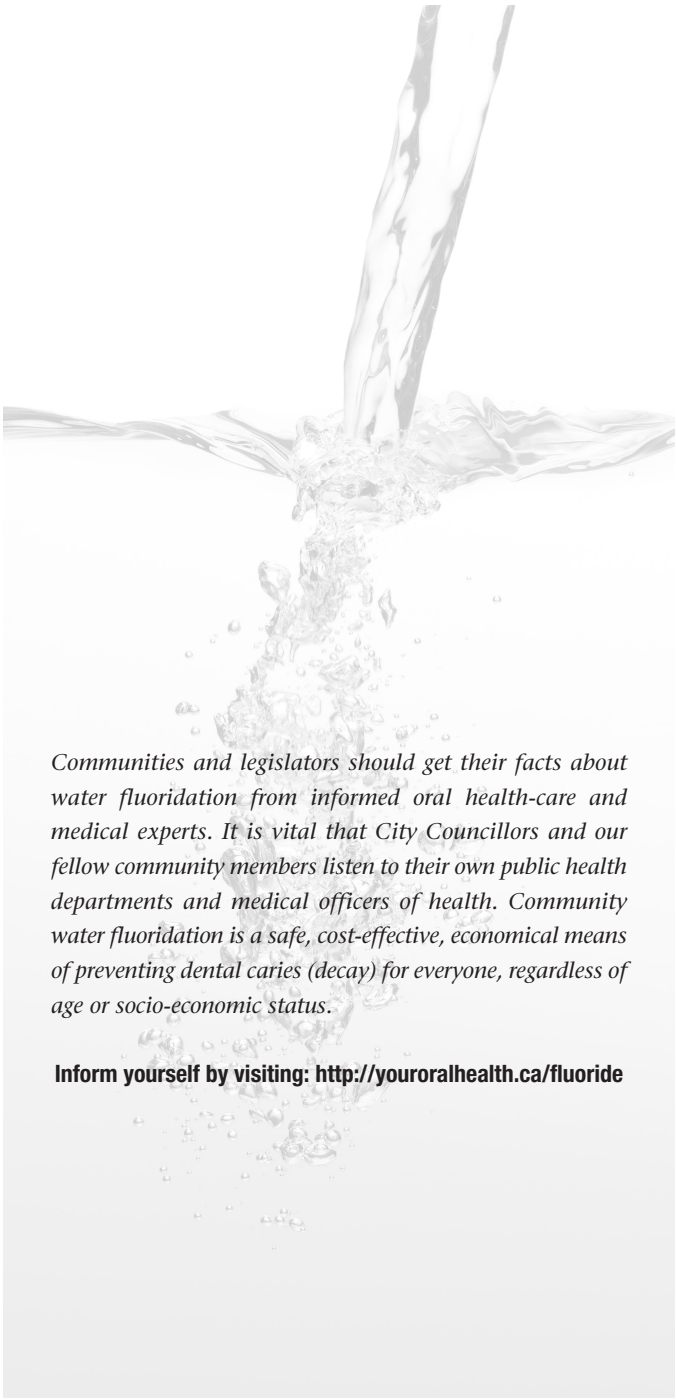




Promoting Better Health in Your Community

**The Essential Benefits
of Water Fluoridation**





Communities and legislators should get their facts about water fluoridation from informed oral health-care and medical experts. It is vital that City Councillors and our fellow community members listen to their own public health departments and medical officers of health. Community water fluoridation is a safe, cost-effective, economical means of preventing dental caries (decay) for everyone, regardless of age or socio-economic status.

Inform yourself by visiting: <http://youroralhealth.ca/fluoride>

History of Water Fluoridation in Canada

The connection between fluoride and dental health was first explored early in the 20th century. By the 1950s, communities across North America had begun fluoridating their water supplies. Ontario was one of the first places in the world to introduce community water fluoridation (CWF) as a public health initiative to reduce tooth decay. The first Canadian CWF trials began in Brantford, Ont., in 1945. At last count, 9,229,015 Ontarians had access to fluoridated water, representing 75.9 percent of the population of the province.¹ Currently, CWF is practised in more than 30 countries around the world, providing more than 370 million people with optimally fluoridated water.²

Water fluoridation can reduce tooth decay in children's primary teeth by up to 60 percent, and in their permanent teeth by up to 35 percent.⁵



The Benefits

- After the common cold, tooth decay is the second most common disease in the world, and it is also something that is preventable.³ As dentists, we want what is best for our patients. CWF is the single most effective public health measure for preventing tooth decay — it's just that simple.⁴
- Dental decay is the second most frequent condition suffered by children and is one of the leading causes of absences from school. Water fluoridation can reduce tooth decay in children's primary teeth by up to 60 percent, and in their permanent teeth by up to 35 percent. Adults experience a 20 to 40 percent reduction in tooth decay from lifelong exposure to water fluoridation.⁵
- Limited access to dental care and poor oral hygiene can lead to severe health complications as well as negative social consequences. Fluoridating community water benefits *everyone* living in that community, regardless of age or socio-economic status.^{6,7,8}

Fluoride works by making the outer layer of teeth stronger and less likely to get cavities. It can also prevent or even reverse the decay process.¹¹



The Science

- Reputable scientific studies conducted throughout the past 70 years have consistently shown that fluoridation of community water supplies is a safe and effective way to prevent dental decay in both children and adults.^{9,10}
- Fluoride works by making the outer layer of teeth stronger and less likely to get cavities. It can also prevent or even reverse the decay process.¹¹
- When ingested, fluoride not only becomes part of the tooth structures during tooth formation, but it also provides topical protection. Ingested fluoride is retained in saliva and is continually surrounding the tooth.¹² This preventive measure is especially important for our aging baby-boomer population, which will be vulnerable to dental diseases of aging such as root decay.
- In Ontario, fluoride additives must meet rigorous standards of quality and purity before they can be used. Studies show that when fluoride is added to water at recommended levels in Ontario and across the country, it is not linked to any adverse health effects.¹³ Health Canada has determined that the optimal concentration of fluoride in drinking water for dental health is 0.7 mg/L.¹⁴
- Acute fluoride toxicity occurring from the ingestion of optimally fluoridated water is impossible.¹⁵

The average lifetime cost per person to fluoridate a community can be less than the cost of one dental filling.¹⁷



The Economics

- According to the Centers for Disease Control and Prevention (CDC), for every dollar you spend fluoridating the community water supply, \$38 is saved in oral health care.¹⁶
- CWF saves money, in addition to teeth. The average lifetime cost per person to fluoridate a community can be less than the cost of one dental filling.¹⁷
- In Colorado (2003), CWF was associated with an annual savings of \$148.9 million, or a mean of \$60.78 per person.¹⁸
- In 2010, a New York study found that the annual treatment costs of caries-related dental procedures for children in the New York State Medicaid program were \$23.65 higher for those living in less-fluoridated counties compared to children living in fluoridated counties.¹⁹

The use of fluoride for the prevention of dental cavities is endorsed by more than 90 national and international professional health organizations.²⁰



Expert Advice

The use of fluoride for the prevention of dental cavities is endorsed by more than 90 national and international professional health organizations, including: the Canadian Dental Association (CDA), Health Canada, the U.S. Food and Drug Administration; Centers for Disease Control and Prevention; and the World Health Organization.²⁰

The Canadian Dental Association (2012)

“CDA supports fluoridation of municipal drinking water (at minimum levels required for efficacy as recommended by the Federal-Provincial-Territorial Committee on Drinking Water) as a safe, effective and economical means of preventing dental caries in all age groups.”²¹

Health Canada (2011)

“Scientific reviews conducted by a number of international agencies and by Health Canada are in agreement that the weight of evidence from all currently available studies indicates there is no link between any adverse health effects and exposure to fluoride in drinking water at levels that are below the maximum acceptable concentration of 1.5 mg/L in Canada.”²²

Canadian Association of Public Health Dentistry (2014)

“The Canadian Association of Public Health Dentistry endorses community water fluoridation as an important public health measure to prevent dental caries (tooth decay) in a population. It is safe, effective, ethical, legal, reduces oral health disparities and is cost-effective.”²³

The Chief Medical Officer of Health for Ontario (2012)

“All Ontarians should have access to optimally fluoridated drinking water. Fluoridation is highly effective and can reach large populations who benefit from it. Other preventive services may be less accessible to people without private dental insurance or those living on low incomes, which further reinforces the importance of “population-based” prevention such as community water fluoridation.”²⁴

Ontario Medical Association (2010)

“Ontario’s doctors want to dispel the misconceptions and ease the concerns of those who question the safety of fluoride. The Ontario Medical Association (OMA) has approved a policy that supports the addition of fluoride to drinking water, following extensive research on the issue. Ontario drinking water systems that fluoridate their water supply are closely monitored, report continually on fluoride concentrations, and are well within the safety guidelines.”²⁵

Expert Advice

City of Toronto (2014)

*"Fluoride has been added to the Toronto drinking water supply since 1963. Studies of Toronto children 12 years after the introduction of water fluoridation and again in 2000 show that by 2000, there was a 77.4% mean reduction in decayed, missing and filled baby teeth for five year-old children. There was also a 390% increase in the percentage of children with no tooth decay when compared to rates reported prior to the addition of fluoride in 1963."*²⁶

The American Dental Association (no.d)

*"The American Dental Association [ADA] continues to endorse fluoridation of community water supplies as safe and effective for preventing tooth decay. This support has been the Association's position since the policy was first adopted in 1950. The ADA's policies regarding community water fluoridation are based on the overwhelming weight of peer-reviewed, credible scientific evidence."*²⁷

U.S. Surgeon General, Dr. Regina Benjamin (2009-2013)

*"Community water fluoridation is one of the most effective choices communities can make to prevent health problems while actually improving the oral health of their citizens...Fluoridation's effectiveness in preventing tooth decay is not limited to children, but extends throughout life, resulting in fewer and less severe cavities. In fact, each generation born since the implementation of water fluoridation has enjoyed better dental health than the generation that preceded it... I join with previous Surgeons General in acknowledging community water fluoridation as an effective public health strategy, and recommend its continued use and expansion to enhance the oral health of all Americans."*²⁸

The Centers for Disease Control and Prevention (2013)

*"For 65 years, community water fluoridation has been a safe and healthy way to effectively prevent tooth decay. CDC has recognized water fluoridation as one of 10 great public health achievements of the 20th century."*²⁹

The World Health Organization (2012)

*"Dental cavities can be prevented by maintaining a constant low level of fluoride in the oral cavity. Fluoride can be obtained from fluoridated drinking water, salt, milk and toothpaste, as well as from professionally-applied fluoride or mouth rinse. Long-term exposure to an optimal level of fluoride results in fewer dental cavities in both children and adults."*³⁰

Frequently Asked Questions

Adding fluoride to public drinking water is still the most economical means of giving the benefits of fluoride to all members of the community. Not only do children need fluoride protection while their teeth are developing, adults also need it to prevent cavities.

What exactly is fluoride?

Fluoride is a mineral found in rocks and soil. When water passes over rock formations, it dissolves fluoride compounds that are present, releasing fluoride ions. Therefore, fluoride is naturally present in all water sources.

How does fluoride prevent tooth decay?

Fluoride works by stopping or even reversing the tooth decay process. It keeps the enamel of the tooth strong and solid by preventing the loss of important minerals. Fluoride's main effect occurs after the tooth has erupted above the gum, when small amounts of fluoride are maintained in the mouth in saliva.

Where do I get fluoride from?

Fluoride is provided through drinking water, toothpaste, mouthwash and supplements (tablets or drops). Gels and rinses applied by your dentist are also an important source of fluoride.

If fluoride is available in other ways, why is it added to our drinking water?

Fluoridation of community water supplies is the best way to provide oral health protection to a large number of people at a low cost. All members of a community can have the same benefits of fluoride in their water, regardless of their ages and socio-economic status.

Frequently Asked Questions

Who is responsible for the fluoride levels in our drinking water?

The responsibility of fluoridation of drinking water supplies is a decision that is made by each municipality, in collaboration with the provincial/territorial government and Health Canada.³¹ Together, through the Federal-Provincial-Territorial Committee on Drinking Water, both levels of government develop the Guidelines for Canadian Drinking Water Quality. These guidelines are reviewed and revised periodically to take into account new evidence-based scientific knowledge.

According to Health Canada, “Health Canada’s Chief Dental Officer has reviewed the available science on dental effects of fluoride, and sought external expert advice from the scientific dental community. Experts provided a recommendation on the optimal level, which was accepted by Health Canada’s Chief Dental Officer. **As a result, the optimal concentration of fluoride in drinking water for dental health has been determined to be 0.7 mg/L for communities who wish to fluoridate. This concentration provides optimal dental health benefits and is well below the maximum acceptable concentration to protect against adverse effects [emphasis added].**”³²

Should we stop drinking fluoridated water if we are getting it from other sources?

For most individuals, only using fluoridated toothpaste is not enough; the oral health benefits from CWF build on those from fluoride toothpaste. The fact that individuals receive fluoride from multiple sources is taken into account when recommended water fluoridation levels are determined. In 2008, a Fluoride Expert Panel recommended that Health Canada “adopt a level of 0.7 mg/L as the optimal target concentration for fluoride in drinking water, which would prevent excessive intake of fluoride through multiple sources of exposure.”³³ Greater lifetime exposure to CWF has also been found to be connected to lower decay rates.³⁴

I've been hearing about health risks associated with water fluoridation. Are these claims true?

In 2010, after referring to more than 400 published scientific studies, Health Canada released a 104-page document, *"Guidelines for Canadian Drinking Water Quality: Guideline Technical Document — Fluoride."* In this report, Health Canada explains that: "The weight of evidence from all currently available studies does not support a link between exposure to fluoride in drinking water at 1.5 mg/L and any adverse health effects, including those related to cancer, immunotoxicity, reproductive/developmental toxicity, genotoxicity and/or neurotoxicity. It also does not support a link between fluoride exposure and intelligence quotient deficit, as there are significant concerns regarding the relevant studies, including quality, credibility, and methodological weaknesses."³⁵

It should be noted that Health Canada has determined that the optimal concentration of fluoride in drinking water for dental health be 0.7mg/L for communities that wish to fluoridate. Therefore, even when *double* this amount is used, it is not linked to any adverse health effects.

What is fluorosis? Should I be concerned?

Fluoride intake from water and other fluoride sources such as toothpaste and mouth rinses, during the ages when teeth are forming (from birth through age eight) can result in changes in the appearance of the tooth's surface called dental fluorosis. In most cases, dental fluorosis is mild and appears as white spots that are barely noticeable and are difficult (except for a dental health-care professional) to see.³⁶ The proper amount of fluoride from infancy through old age helps prevent and control tooth decay and fluorosis. The CDA explains that fluoride supplements (chewable tablets, lozenges or drops) are not recommended for the majority of Canadians. However, health professionals such as physicians or dentists may decide to prescribe a fluoride supplement to patients who are high risk and live in non-fluoridated communities and who are also unable to obtain fluoride from any other form (e.g. toothpaste). To help eliminate the chances of fluorosis, a risk assessment of the patient's fluoride intake should be done before prescribing a fluoride supplement.³⁷

Studies show that when fluoride is added to water at recommended levels, it is not linked to adverse health effects.³²



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 include sodium fluoride, sodium fluorosilicate and hydrofluorosilicic acid (HFA).³⁸

MYTH: Community water fluoridation is a form of mass medication.

FACT: Fluoride is not a medication. As per the *Food and Drug Act*, fluoride used in drinking water is not considered to be a drug by Health Canada.³⁹ CWF is the adjustment of a naturally occurring mineral found in water in order to prevent dental decay. Courts have ruled that water fluoridation is not a form of compulsory mass medication or socialized medicine.⁴⁰ In fact, water that has been fortified with fluoride is similar to fortifying salt with iodine, milk with vitamin D and orange juice with vitamin C — none of which are medications.⁴¹

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

FACT: By-products are 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. Instead of this valuable mineral going to waste, it is removed from phosphate rock so that it can be added to water to strengthen the enamel of teeth.

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, 1990* which includes continuous monitoring of fluoride concentrations.⁴²

Myths and Facts

Any substance that is added to drinking water must pass rigorous testing to ensure that it meets the high standard set by the water industry, including the National Sanitation Foundation and American National Standards Institute (NSF/ANSI) Standards. The Middlesex-London Health unit explains that “HFA dissolves completely when added to water. The NSF 60 standard for fluoridation products provides a toxicological assessment of the components of HFA after they have dissolved in water. This ensures the product is safe at the levels used to fluoridate water.”⁴³ 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.⁴⁴

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.

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.⁴⁵

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.⁴⁶ 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.

MYTH: Excessive ingestion of HFA during early childhood years may damage the tooth forming cells leading to a permanent defect in the enamel known as dental fluorosis. In November 2006, the ADA advised that parents should avoid giving babies fluoridated water.

FACT: Dental fluorosis only happens before teeth are fully formed. Most incidences of dental fluorosis are caused when children swallow toothpaste, which contains thousands of times more fluoride than fluoridated water, or are prescribed the wrong dosage of a fluoride supplement that is given over a period of time.^{47,48}

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. Many vitamin labels have similar statements: “Keep out of reach of children.” That’s because almost anything can be harmful if left in the hands of unsupervised, young children.

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 negatively affect the health of the child or the health of the child’s teeth.⁴⁹

To reduce the chance of fluorosis, 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. Your dentist, pediatrician or family physician can help determine how to optimize your child’s fluoride intake.

Myths and Facts

MYTH: There are no benefits to community water fluoridation and it is a waste of taxpayers' dollars.

FACT: The cost of prevention is far lower than the cost of treating dental disease. In studying the effects of fluoride in the community water supply, a study from Public Health England released in 2014 found that, on average, there are 15 percent fewer five-year-olds with tooth decay in fluoridated areas than in non-fluoridated areas.⁵⁰ Ignoring the benefits of lowered decay rates, the savings to taxpayers can still be found because in fluoridated areas there are 45 percent fewer hospital admissions of children aged one to four for dental caries (mostly for extraction of decayed teeth under general anesthetic) than in non-fluoridated areas.⁵¹

A 2007 report by the Institut National de Santé Publique shows that in Dorval, Québec, the discontinuation of water fluoridation in 2003 led to the doubling of the percentage of kindergarten children at risk of developing cavities by 2005.⁵²

Moreover, in 2013 the Canadian Institute for Health Information (CIHI) looked at the treatment of preventable dental cavities in preschoolers, with a specific focus on day surgery under general anesthesia. It was found that "day surgery for early childhood caries occurred about once for every 100 children age one to younger than five during the two-year period 2010-2011 to 2011-2012. These operations to fill or treat cavities and extract teeth were almost always conducted under general anesthesia (99 percent)."⁵³ The public costs for hospital dental day surgery is \$21.2 million per year for children age one to younger than five, and this is only a fraction of the costs when other variables such as travel and the costs of care providers is taken into consideration.⁵⁴ Both individual and public costs exist when preventative measures to combat dental disease are not utilized.

MYTH: According to the U.S. National Research Council (NRC), risks of fluoride to health involve more issues 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 CWF 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. 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.

Studying community water fluoridation in Canada, Soneman, Wallar and Papadopolous concluded: “No evidence was found for an association between water fluoridation and any of the following adverse outcomes: bone mineral density, bone fractures, bone cancer, or cancer in other body tissues.⁵⁵ Recently Broadbent *et al.* reported that: “The findings do not support the assertion that fluoride exposure in the context of CWF can affect neurologic development or IQ.⁵⁶

A study from Public Health England released in 2014 found no evidence of a difference in the rate of hip fractures between fluoridated and non-fluoridated areas, no evidence of an association between fluoridation and Down’s Syndrome, and found strong evidence that the rate of kidney stones was lower in fluoridated areas compared to non-fluoridated areas, following adjustment for age, gender and deprivation.⁵⁷

While some studies have also linked water fluoridation to other negative effects such as lower IQ levels, cancer, and bone problems, these findings are seen to be scientifically unsound and arising from low-quality methodology.⁵⁸

Health Canada has stated that: “The weight of evidence from all currently available studies does not support a link

Myths and Facts

between exposure to fluoride in drinking water at 1.5 mg/L and any adverse health effects, including those related to cancer, immunotoxicity, reproductive/developmental toxicity, genotoxicity and/or neurotoxicity. It also does not support a link between fluoride exposure and intelligence quotient deficit, as there are significant concerns regarding the relevant studies including quality, credibility, and methodological weakness.⁵⁹

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 and body weight, along with 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 to 26 months) in order to be the most protective to 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.⁶⁰ Many common substances essential to life and good health — salt, iron, vitamins A and D, chlorine, oxygen, fluoride, and even water itself — can be toxic in excessive quantities.⁶¹

MYTH: Fluoride doesn't belong in drinking water.

FACT: Fluoride exists naturally in virtually all water supplies, and even in various brands of bottled water. If this statement were true, then water, fish, meat, cheese, potatoes, and other foods that contain small levels of fluoride from natural and other sources should all be avoided. A 2010 Nevada study showed that living in a community without CWF was one of the strongest predictors of high rates of decay and other dental problems among teenagers.⁶²

Core Messages*

- **Fluoride is a mineral that exists naturally in virtually all water supplies, even the ocean.** Usually, however, the amount of fluoride is too low to prevent tooth decay. This is why many communities in Canada add a small amount to reach the level proven to protect teeth.
- **The leading health experts endorse community water fluoridation as a safe, effective way to reduce cavities.** These experts include the Canadian Dental Association, The Canadian Pediatric Society, Health Canada, the Centers for Disease Control and Prevention, and the World Health Organization.
- **Using fluoride toothpaste is important, but it doesn't give maximum protection against cavities.** Drinking fluoridated water provides crucial added protection against tooth decay, and many studies prove it.
- **Canada is one of the birthplaces of community water fluoridation.** Our dental and medical officials from the 1940s were pioneers who helped conduct the initial research proving that fluoridation significantly reduces cavities. Many other countries have since followed our lead.
- **Canada has a tradition of fortifying foods and beverages with vitamins and minerals to protect human health.** For example, Vitamin D is added to milk, and folic acid is added to bread and pasta. Adding fluoride to water is one more way we help keep children and adults healthy.
- **Fluoridation's positive impact is supported by hundreds of studies and nearly 70 years of experience.** Some of these studies have been conducted within the past few years.

* The ODA would like to thank Matt Jacob, of the Children's Dental Health Project, for providing this concise core messaging.



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