

# Fluoride & Well Water

## Basic Information You Should Know

Fluoride is a natural substance that comes from the element fluorine, which is found naturally in rocks and soil. Water passes through the earth and absorbs the naturally occurring fluoride. As a result, most water contains some amount of fluoride.

The content of fluoride varies by region. Dry regions generally have higher fluoride levels in their water than regions that have higher average rainfall amounts. Groundwater typically contains more fluoride than surface water. Fluoride concentration may be difficult to determine for well water depending on the depth of the well and the seasonal changes that occur.

Fluoride occurs naturally in most groundwater, at levels ranging from 0.1 to more than 12 parts per million (ppm). The fluoride level in well-water will depend on the nature of the rock near the well and the presence of fluoride-bearing minerals.

At relatively low concentrations (0.7-1.2 ppm), fluoride is well known to have positive effects on our oral health. Tooth decay is still one of the most common childhood diseases. The Centers for Disease Control and Prevention (CDC) reported that more than 25% of children between the ages of 2 and 5 have at least one cavity. 50% of adolescents between the ages of 12 and 15 were reported to have at least one cavity, while approximately 67% of adolescents between the ages of 16 and 19 had at least one cavity.

Tooth decay is caused by the build-up of plaque, bacteria which breaks down sugars in food and produces acid. Consequently, the hard enamel surfaces of teeth are dissolved by the production of damaging acids. This allows penetration of bacteria through the enamel, resulting in cavities that weaken teeth. People who suffer from cavities may experience severe pain, tooth loss, or in some cases, widespread infection.

## Safety of Fluoride in Water Supplies

As a health care provider, you can educate your patients on how fluoride helps prevent and reverse early stages of tooth decay. A patient who understands how the process works is more likely to make sure he or she is exposed to appropriate levels. When fluoride is ingested, it is exposed to the surface of the teeth and also incorporates itself into the structure of developing teeth. This prevents the acid-producing bacteria from dissolving or demineralizing tooth enamel. Although fluoride intake can reverse cavities in early stages, it should particularly be stressed as a preventive measure, as it does not repair cavities.

Some people may have concerns regarding the safety of fluoride in water supplies. You can share statements given by the American Dental Association (ADA), Centers for Disease Control and Prevention (CDC), and the U.S. Surgeon General. For over half a century, "the ADA has unreservedly endorsed the fluoridation of community water supplies as safe, effective, and necessary in preventing tooth decay."

It is important to be aware of fluoride concentrations consumed because overexposure to fluoride can result in negative health effects. Consuming excess amounts of fluoride over time can accumulate in the bones, eventually resulting in skeletal fluorosis. Skeletal fluorosis can cause pain, stiffness of the joints, damage to bone structure, calcification of ligaments, and crippling effects. The U.S. Environmental Protection Agency (EPA) has determined a maximum safe level of fluoride and set an enforceable drinking water standard for fluoride as 4 mg/L.

Even at lower levels, dental fluorosis may occur; therefore, the EPA has also recommended a secondary standard of 2 mg/L (~2 ppm). Dental fluorosis is not considered to be a disease, but it affects the appearance of teeth. A mild form of dental fluorosis may create faint white lines or streaks that may not be very visible. Dental fluorosis in a more moderate form may lead to more visible white spots on the teeth. The most serious cases are those with severe dental fluorosis, who may develop brown stains and pits on teeth.

Dental fluorosis only affects the teeth before they erupt from the developing gums, so the EPA advises children under age 9 to not drink water containing more than 2 mg/L (~2 ppm) of fluoride.

ADA offers recommendations for parents and caregivers of infants. To reduce the risk of fluorosis for infants that drink formula as their primary source of nutrition, it should be mixed with fluoride-free water. Some brands of bottled water contain very little to no amounts of fluoride. This information may be provided on labels or by contacting the individual brands that supply bottled water. For parents and caregivers of infants who are 12 months and below, suggest using ready-to-feed formula to avoid consuming excess fluoride. Fluoride intake should be completely avoided in infants between 0 and 6 months. At 6 to 12 months, infants may receive a small amount (0.25 mg/L or 0.25 ppm) of fluoride. Continuing to mix fluoridated water with infant formula increases the risk of a child's baby teeth and permanent teeth to develop mild fluorosis. Some providers may not agree with this approach for high-risk children because they need fluoride's protection.

It is also important for parents and caregivers to know fluoride levels in their drinking water so that this information can be given to you as the child's health care provider. This information can help determine the best course of care for a child's dental health. For example, if fluoride levels in a child's water source are below 0.6 ppm, you may suggest fluoride supplements after considering the child's risk of developing tooth decay and their exposure to other sources of fluoride like toothpaste and drinking water at their school or daycare. Rather than providing systemic fluoride supplements, some providers suggest topical fluoride application (varnish), as it may be more effective and safe.

If the natural fluoride level of well water exceeds optimal levels, suggest reducing or removing fluoride from the water, especially if the water is being supplied to children under the age of 9. Effective treatment options include using reverse osmosis treatment, activated alumina cartridges, and distillation methods. The uses of bone charcoal, electro dialysis, and deionization have also been found to be effective.

It should be noted that the effectiveness of the treatment methods mentioned above partly depends on the pH level of the water. For example, activated alumina is most effective at removing fluoride when the pH range is between 5.5 and 6.5.

Also, inform your patients that boiling water is ***NOT*** an effective treatment option, as it will concentrate the amount of fluoride in the water.

Patients who are customers of public water systems can ask their water supplier what types of testing/treatment they perform. Public water systems are required by the EPA to provide an annual Consumer Confidence Report, which provides public water customers with information about the source of their water, the presence of contaminants, if any, in their drinking water, and how these contaminants may affect their health.

### For more information about Fluoride

American Dental Association/Centers for Disease Control and Prevention Brochure. (2006). Nature's way to Prevent Tooth Decay: Water Fluoridation. [www.cdc.gov/fluoridation/pdf/natures\\_way.pdf](http://www.cdc.gov/fluoridation/pdf/natures_way.pdf)

Centers for Disease Control and Prevention. Water Fluoridation. Last Retrieved on July 15, 2010. [www.cdc.gov/fluoridation/engineering/faqs.htm](http://www.cdc.gov/fluoridation/engineering/faqs.htm)

Fawell J, Bailey K, Chilton J, Dahi E, Fewtrell L and Magara Y. World Health Organization. (2006). Fluoride in Drinking Water. Last Retrieved on July 15, 2010 [http://www.who.int/water\\_sanitation\\_health/publications/fluoride\\_drinking\\_water\\_full.pdf](http://www.who.int/water_sanitation_health/publications/fluoride_drinking_water_full.pdf)

Water Quality Association. (March 2005). Technical Application Bulletin: Fluoride. Last Retrieved on July 15, 2010. [www.wqa.org/pdf/TechBulletins/TB-Fluoride.pdf](http://www.wqa.org/pdf/TechBulletins/TB-Fluoride.pdf)

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### Association of Clinicians for the Underserved

The Association of Clinicians for the Underserved (ACU) participated in the writing and research for this information sheet. The ACU is a nonprofit, transdisciplinary organization of clinicians, advocates and health care organizations united in a common mission to improve the health of America's underserved populations and to enhance the development and support of the health care clinicians serving these populations. Please visit the ACU at [www.clinicians.org](http://www.clinicians.org).

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