

Community Water Fluoridation



"...one of ten great public health achievements of the twentieth century."¹



Fluoridation in New York State: A Fact Sheet

Addressing Safety Concerns

Fluoride at some level is naturally present in water and food. In New York State, it is not uncommon to have naturally occurring fluoride at 0.2 to 0.5 milligrams per liter of water (mg/L). Thus, all New Yorkers are exposed to some levels of fluoride. Fluoridation of community drinking water is the adjustment of the existing natural fluoride concentration in drinking water to a level that is recommended for tooth decay prevention. The Centers for Disease Control and Prevention (CDC), the Office of the United States' Surgeon General and the New York State Department of Health support fluoridation of public water supplies because of the public health benefits, while being cognizant of the possible health risks of too much fluoride ingestion.

Who is Responsible for Regulating Chemicals in Drinking Water?

The main federal law that ensures the quality of Americans' drinking water is the Safe Drinking Water Act (SDWA). Under SDWA, the U.S. Environmental Protection Agency (EPA) sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards. Standards are set to protect against both naturally-occurring and man-made contaminants that may be found in drinking water. Within New York State, the New York State Department of Health (NYS DOH) oversees the delivery of drinking water to assure that it is suitable for people to drink. Fluoride in drinking water is regulated by EPA and New York State.

Fluoride that is added to drinking water is subject to a system of standards, testing, and are certified by the American Water Works Association (AWWA) and the National Sanitation Foundation/American National Standards Institute (NSF/ANSI). Both of these entities are nonprofit, nongovernmental organizations. The NSF/ANSI standards 60 and 61 limit a chemical or product's contribution of contaminants to drinking water applications. Standards 60 and 61 provide for product purity and safety assurance that aim to prevent adding harmful levels of contaminants from water treatment additives. New York State has regulations requiring product compliance with Standards 60 and 61.

What is the concentration of fluoride recommended for drinking water in New York State?

- The target fluoride concentration in water recommended for tooth decay prevention in NYS is 1 mg/L. The New York State Department of Health monitors all water systems that add fluoride to assure that the concentration of fluoride is in the range of 0.8 to 1.2 mg/L.
- The maximum concentration allowed in New York State drinking water for fluoride, including naturally occurring levels, is 2.2 mg/L. This standard is lower than the federal standard and is the standard that the State public water supplies must meet.

- The federal drinking water standard (maximum contaminant level) for fluoride in drinking water including fluoride that naturally occurs, is 4 milligrams per liter of water (4 mg/L). This is set to prevent Stage III skeletal fluorosis, a crippling bone and joint condition.
- The EPA has also set a non-enforceable standard called secondary maximum contaminant level for fluoride, including naturally occurring fluoride. This standard of 2 mg/L of fluoride in water was set to reduce the cosmetic effects on teeth (moderate and severe forms of enamel fluorosis), which is a discoloration and/or pitting of teeth.

What are the risks associated with exposure to fluoride at 1 mg/L in drinking water?

A systematic review conducted by the University of York, UK assessed the evidence for potential adverse effects. This review did not reveal causal association between fluoride in drinking water at 1 mg/L and severe enamel fluorosis, skeletal fluorosis, bone fractures or bone cancer. Water fluoridation is associated with an increased occurrence of milder forms of enamel fluorosis.² Enamel fluorosis that results from drinking fluoridated water appears as a barely noticeable white marking of the outer tooth enamel that is of no cosmetic or functional significance. A study conducted in New York State showed that the prevalence of enamel fluorosis ranged from 14.4% to 18.6% in fluoridated communities. However, the study also showed that the prevalence of enamel fluorosis in non-fluoridated communities ranged from 11.1% to 14.8%.³ Given that fluorosis occurred in both fluoridated and non-fluoridated communities, it is likely that water fluoridation is not the only risk factor for mild fluorosis. Other risk factors included use of fluoridated tooth paste by young children and dietary supplements.³ (Many parents may not be aware that use of fluoride toothpaste is not recommended in children under age 2 years without consulting a dentist). Nonetheless, the NYSDOH has concluded that the known benefits of fluoride to prevent or reduce the incidence of tooth decay and dental fillings outweigh the risk of milder forms of fluorosis (which is not considered as an adverse effect by public health agencies).

What are the risks associated with exposure to fluoride at 4 mg/L (and above) in drinking water?

The effects generally associated with high levels of exposure to fluoride include severe enamel fluorosis, skeletal fluorosis, and bone fractures. A recently released National Research Council (NRC) report titled *Fluoride in Drinking Water*⁴ made the following observations:

- Severe enamel fluorosis occurs in about 10% of children in US communities with water fluoride concentrations at or near the current federal drinking water standard of 4 mg/L. The prevalence of severe enamel fluorosis is very low below about 2 mg/L of fluoride in drinking water.
- There are very few known clinical cases of skeletal fluorosis in the US, where about 200,000 people (in 1992) had water concentrations of 4 mg/L or above.³
- Overall, there was consensus among the committee that there is scientific evidence that under certain conditions fluoride can weaken bone and increase the risk of fractures. However, there was not a consensus on the group about the risks of bone fractures associated with 4 mg/L in drinking water in the US. The majority of the committee concluded that lifetime exposure to fluoride at drinking water concentrations of 4 mg/L or higher is likely to increase fracture rates in the population, particularly in some people who are prone to accumulate fluoride into their bones (e.g., people with renal disease). However, three of the 12 members judged that the evidence only supported a conclusion that the EPA standard (MCLG) might not be protective against bone fracture, and that more evidence is needed that bone fractures occur at an increased frequency in human populations exposed to fluoride at 4 mg/L before drawing a conclusion that the EPA standard likely poses a risk of increased bone fracture.

- The evidence as to whether fluoride is or is not associated with cancer is not clear. Some studies show no association; others show an association. An exploratory study showed an increasing risk for osteosarcoma with age (peak at age 7) among boys but not in girls. An exploratory study showed an increased risk for osteosarcoma with age (peak at age 7) among boys but not in girls. A relatively large scale study is underway at Harvard School of Dental Medicine and is expected to be published soon. According to the investigators at Harvard, the findings of the earlier study could not be replicated. The NRC Committee advised the EPA to consider the results of this study to help determine what follow-up studies are needed.
- Sufficient relevant data were not available to consider the effects of fluoride on any other systems in the body.

Two studies conducted by investigators in the New York State Department of Health failed to show an association between fluoridation and osteosarcoma in New York State.^{5,6}

What does the NRC committee's report mean for New York State residents?

Naturally occurring fluoride levels of 4 mg/L or above in drinking water supplies (private or public) are rare in NYS and the NYS standard for fluoride in public water supplies is 2.2 mg/L. Moreover, the target concentration for water fluoridation is 1 mg/L. Thus, it is unlikely that NYS residents are exposed to drinking water containing 4 mg/L of fluoride.

Because the NRC committee did not evaluate the risks or benefits of the lower fluoride concentrations (0.7 to 1.2 mg/L) used in water fluoridation, the committee's conclusions regarding the potential for adverse effects such as severe enamel fluorosis, skeletal fluorosis and bone fractures from exposure to fluoride at 2 to 4 mg/L in drinking water do not apply at the lower water fluoride levels commonly experienced by New York State residents.

What can be done to reduce the risk of enamel fluorosis?

The proper amount of fluoride helps prevent and control tooth decay. An excessive amount consumed during tooth development in infancy and childhood can also result in a range of changes in the enamel surface of the tooth. These changes have been broadly termed enamel fluorosis. Ingestion of fluoride toothpaste and inadvertent use of fluoride tablets in fluoridated areas have been associated with an increased risk for enamel fluorosis. Here are some simple ways to reduce the risk of enamel fluorosis:

- Know the fluoride concentration in the source of drinking water. Water containing 1 mg/L is considered optimum for caries prevention. There is no need for fluoride supplements if the fluoride level in water is greater than 0.6 mg/L.
- Counsel parents and caregivers on the use of fluoride toothpaste by young children, especially those younger than 2 years to avoid ingestion of too much toothpaste because it has high concentration of fluoride (approximately 1000 parts per million). Children under age 6 should use only a pea-sized amount of fluoride toothpaste twice a day; parents should consult their child's doctor or dentist concerning use of fluoride toothpaste for children under age 2.

Some reports have also expressed concern about the amount of fluoride contained in water used for mixing infant formula may also influence the possibility of developing enamel fluorosis. The New York State Department Health concurs with the Centers for Disease Control and Prevention (CDC) that water fluoridated at the optimum level has not been shown to cause adverse health effects.

(www.health.state.ny.us/prevention/dental).⁸ Further, the department has concluded that the risk of

enamel fluorosis associated with infant formula prepared with fluoridated water is low for several reasons:

- The occurrence of advanced forms of enamel fluorosis is extremely rare in fluoridated communities even though some water systems have been fluoridating for over 50 years. Milder forms of enamel fluorosis are not noticeable.
- The critical period for permanent tooth development when enamel fluorosis is most likely to occur, is later in life when children are less likely to be on infant formula.
- The theoretical amounts of fluoride that might cause advanced forms of enamel fluorosis are reached with exclusive and/or excessive formula use for a prolonged period. According to the National Center for Education in Maternal and Child Health's Bright Futures Guidelines, infants should begin solid foods between four and six months, if they are developmentally ready. This will also reduce the exposure to excessive levels of fluoride. Therefore, if infant formula is used as recommended the risk of enamel fluorosis would be minimized significantly.

References

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