

Infant Formula and Fluoridated Water

First of all, it is important to recommend breastfeeding as ideal for infants. The CDC is committed to increasing breastfeeding rates throughout the United States and to promoting optimal breastfeeding practices. Both babies and mothers gain many benefits from breastfeeding. Breast milk is easy to digest and contains antibodies that can protect infants from bacterial and viral infections. More can be learned about this subject from the "CDC Recommendations for Breastfeeding."



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Through concerted efforts by the Oregon Department of Human Services, the rate of breastfeeding in Oregon has reached 89%. (Oregonian, 2006)

If breastfeeding is not possible, several types of formula are available for infant feeding. Parents and caregivers are encouraged to speak with their pediatrician about the infant formula best suited for their child.

Infant formula manufacturers take steps to assure that infant formula contains low fluoride levels—the products themselves are not the issue. Although formula itself has low amounts of fluoride, when infant formula concentrate is mixed with fluoridated water and used as the primary source of nutrition, it may introduce fluoride at levels above the amount recommended to minimize the risk for fluorosis. Infants consume little other than breast milk or formula during the first four to six months of life, and continue to have a high intake of liquids during the entire first year. Therefore, proportional to body weight, fluoride intake from liquids is generally higher for younger or smaller children than for older children, adolescents, or adults. Mixing concentrate with fluoridated tap water on an occasional basis is unlikely to be of much risk. However, when used consistently as the primary source of nutrition over longer periods of the first year, a child may receive enough fluoride to increase his/her chances of developing very mild or mild fluorosis. Parents should follow the advice of the formula manufacturer and their child's doctor for the type of water appropriate for the formula they are using.

It is important to remember:

- The concerns here are entirely about fluorosis. There are no other consequences at risk.
- 78% of fluorosis is caused by children using more than the recommended pea-size amount of fluoride toothpaste or inappropriate use of fluoride supplements, with 71% attributed to the toothpaste alone.
- There is a 60 year experience with fluoridation. The only undesirable consequence of infants drinking fluoridated water is minimal and mild fluorosis. Scientists consider these conditions to be inconsequential compared to cavities which are an enormous public health problem.
- A low rate of minimal and mild fluorosis has always been an acceptable consequence of fluoride's cavity prevention effects.



Department of Health and Human Services
Centers for Disease Control and Prevention

(http://www.cdc.gov/fluoridation/safety/infant_formula.htm)

Background: Infant Formula and the Risk for Enamel Fluorosis

The proper amount of fluoride from infancy through old age helps prevent and control tooth decay. In a minority of children, fluoride exposure during the ages when teeth are forming (from birth through age 8) also can result in a range of changes within the outer surface of the tooth called enamel fluorosis. Recent evidence suggests that mixing powdered or liquid infant formula concentrate with fluoridated water on a regular basis may increase the chance of a child developing the faint white markings of very mild or mild enamel fluorosis. This occurs on baby and permanent teeth while they are forming under the gums. Once the teeth come into the mouth, they are no longer able to develop this condition. Typically, very mild or mild fluorosis is barely noticeable, if noticed at all. Studies have not shown that teeth are likely to develop more esthetically noticeable forms of fluorosis, even with regular mixing of formula with fluoridated water.

In children younger than 8 years of age, combined fluoride exposure from all sources—water, food, toothpaste, mouth rinse, or other products—contributes to enamel fluorosis. Currently one-third (33%) of children aged 12 to 15 years in the United States have very mild to mild forms of this condition. It is important to understand that some fluoride exposure to developing teeth also plays a long-term role in preventing tooth decay. Parents and health providers should weigh the balance between a child's risk for very mild or mild enamel fluorosis and the benefit of fluoride for preventing tooth decay and the need for dental fillings.

The possibility of an association between fluoride in infant formula and the risk for enamel fluorosis has been studied for many years. Until now, most researchers concluded that fluoride intake during a child's first 10 to 12 months had little impact on the development of this condition in permanent teeth. A recent study, however, has raised the possibility that fluoride exposure during the first year of life may play a more important role on fluorosis development than was previously understood. It now appears that the amount of the fluoride contained in the water used for mixing infant formula may influence a child's risk for developing enamel fluorosis, particularly if the child's sole source of nutrition is from reconstituted infant formula.

CDC will continue to assess the science regarding the use of fluoride in preventing tooth decay while limiting enamel fluorosis, and will modify its recommendations as warranted. CDC believes that community water fluoridation is safe and healthy and promotes its use for people of all ages.

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What is the best source of nutrition for infants?

Breastfeeding is ideal for infants. CDC is committed to increasing breastfeeding rates throughout the United States and to promoting optimal breastfeeding practices. Both babies and mothers gain many benefits from breastfeeding. Breast milk is easy to digest and contains antibodies that can protect infants from bacterial and viral infections. More can be learned about this subject at <http://www.cdc.gov/breastfeeding/>.

If breastfeeding is not possible, several types of formula are available for infant feeding. Parents and caregivers are encouraged to speak with their pediatrician about which type of infant formula is best suited for their child.

What type of water does CDC recommend for mixing infant formula?

Parents should follow the advice of the formula manufacturer and their child's doctor for the type of water appropriate for the formula they are using. Parents and caregivers of infants fed primarily with formula from concentrate who are concerned about the effect that mixing their infant's formula with fluoridated water may have in developing enamel fluorosis can lessen this exposure by mixing formula with low fluoride water most or all of the time. This may be tap water, if the public water system is not fluoridated (check with your local water utility). If tap water is fluoridated or has substantial natural fluoride (0.7 mg/L or higher), a parent may consider using a low-fluoride alternative water source. Bottled water known to be low in fluoride is labeled as purified, deionized, demineralized, distilled, or prepared by reverse osmosis. Most grocery stores sell these types of low-fluoride water. Ready to feed (no-mix) infant formula typically has little fluoride and may be preferred for use at least some of the time.

Why is there a focus on infant formula as a source of fluoride?

Infant formula manufacturers take steps to assure that infant formula contains low fluoride levels—the products themselves are not the issue. Although formula itself has low amounts of fluoride, when infant formula concentrate is mixed with fluoridated water and used as the primary source of nutrition, it may introduce fluoride at levels above the amount recommended to minimize the risk for fluorosis. Infants consume little other than breast milk or formula during the first four to six months of life, and continue to have a high intake of liquids during the entire first year. Therefore, proportional to body weight, fluoride intake from liquids is generally higher for younger or smaller children than for older children, adolescents, or adults. Mixing concentrate with fluoridated tap water on an occasional basis is unlikely to be of much risk. However, when used consistently as the primary source of nutrition over longer periods of the first year, a child may receive enough fluoride to increase his/her chances of developing very mild or mild fluorosis.

What types of infant formula may increase the risk for enamel fluorosis?

There are three types of formula, including powder, which comes in bulk or single serve packets, concentrated liquid, or ready-to-feed formula. Ready-to-feed formula is more convenient, but also more expensive. Powder formula is usually the least expensive, but requires mixing with water, as does the liquid concentrate.

Ready-to-feed formula contains little fluoride and does not contribute to enamel fluorosis. Those types of formula that require mixing with water—powdered or liquid concentrates—can be the child's main source of fluoride intake (depending upon the water source) and may contribute to this condition.

What is enamel fluorosis?

Enamel fluorosis is a hypomineralization of the enamel surface of the tooth that develops during tooth formation. Clinically, this appears as a range of cosmetic changes varying from barely noticeable white lines or spots to pitting and staining of the outer enamel layer. More cosmetically objectionable forms of this condition can occur when young children consume excess fluoride from all sources during critical periods of tooth development. More can be learned about enamel fluorosis at http://www.cdc.gov/fluoridation/safety/enamel_fluorosis.htm.

Should all parents consider mixing formula with water from sources other than tap water?

There is no evidence that water containing low concentrations of fluoride introduces a risk for enamel fluorosis in the developing teeth of young children. Some tap water and most bottled water contain low concentrations of fluoride. Mixing concentrate with fluoridated tap water on an occasional basis is unlikely to be of much consequence. For infants whose primary nutrition source is formula from concentrates, parents should take into consideration the fluoride concentration in their water source when making decisions about mixing formula.

How can I find out what the concentration of fluoride is in my tap water?

The best source of information on fluoride levels in your water system is your local water utility. Other knowledgeable sources may be a local public health authority, dentist, dental hygienist, or physician. [My Water's Fluoride](#) on the CDC Web site allows consumers in currently participating states to learn the fluoridation status of their water system. Nearly all tap water contains some natural fluoride, but, depending on the water system, the concentration can range from very low (0.2 mg/L fluoride or less) to very high (2.0 mg/L fluoride or higher). Approximately 67% of all public water systems serving about 170 million people have optimally adjusted fluoride in their water—that is between 0.7 and 1.2 mg/L fluoride.

My city has community water fluoridation (adjusted fluoride in the public water supply). Is it safe to use this tap water for my baby?

Water fluoridation is safe, effective, and healthy. Water fluoridated at a level optimal for oral health poses no known health risks for infants. However, some children may develop enamel fluorosis, a cosmetic condition. All persons should know whether the fluoride concentration in their primary source of drinking water is below optimal (less than 0.7 mg/L fluoride), optimal (0.7–1.2 mg/L fluoride), or above optimal

(greater than 1.2 mg/L fluoride). Use of water below 0.7 mg/L fluoride contributes to a very small risk of developing this condition. The risk increases with an increasing level of fluoride and depends on other factors, such as age and weight of the child and how much formula they drink each day. Knowledge of the fluoride level in the drinking water is also the basis for other individual and professional decisions regarding use of fluoride products by children, such as fluoride toothpaste, mouth rinses, or dietary supplements. In addition, people living in areas where naturally occurring fluoride levels in drinking water are greater than 2 mg/L should consider an alternative water source or home water treatments to reduce the risk of fluorosis for young children. Contact your local water company or utility to learn the fluoride level in your water supply.

Is all bottled water low in fluoride?

Most bottled water contains low fluoride concentrations; however, much variation exists—some brands may contain optimal or higher levels. Because there currently is no requirement to display the fluoride concentration on bottle labels, you may need to contact the bottler to learn the level of fluoride in bottled drinking water. Certain types of bottled water are, by definition, always low in fluoride and can reliably be used for mixing formula. Water labeled as purified, distilled, deionized, demineralized, or produced through reverse osmosis are always low in fluoride.

Can mixing formula with optimally fluoridated tap water cause moderate or severe fluorosis?

For decades, parents have been mixing infant formula with optimally fluoridated tap water (a level determined by the U.S. Public Health Service between 0.7 mg/L fluoride and 1.2 mg/L fluoride and maintained by your water utility to maximize decay prevention and limit fluorosis potential) and no association has been observed between infant formula use and an increased risk for moderate or severe fluorosis. There is no clear evidence that using infant formula from concentrates as the primary source of nutrition increases a child's chances of developing the more severe forms of fluorosis; however, there may be an increased risk for very mild to mild forms.

Are children today at greater risk for developing fluorosis from infant formula mixed with fluoridated water than children in the past?

Children today are at no greater risk of developing enamel fluorosis from infant formula than children in previous generations. Little has changed with regard to the amount of fluoride consumed or the concentration of fluoride in the formula. There has always been some level of very mild and mild fluorosis in children, but it was thought to be caused by fluoride intake after age one. However, new evidence indicates that fluoride exposure during the first year of life may play a greater role in developing fluorosis than was previously thought, so parents may consider reducing the potential for this condition by limiting fluoride from this source.

Will using only low fluoride water to mix formula eliminate the risk for fluorosis?

Using only water with low fluoride levels to mix formula will not eliminate the risk of enamel fluorosis. But following such a practice may reduce the chance of fluorosis occurring. This condition occurs among some children in all communities, even in communities with a low natural concentration of fluoride in the water. Other factors that contribute to developing fluorosis include swallowing of toothpaste and use of dietary supplements that include fluoride (tablets or drops). Learn more about [simple steps to take care of children's teeth](#). (PDF-170K)

What can be done to reduce my child's chance of developing fluorosis?

CDC has developed recommendations to reduce the risk for [enamel fluorosis](#). Remember, fluorosis can only occur during the time of enamel formation, before the teeth come into the mouth. Young children who use multiple sources of fluoride such as fluoride toothpaste, dietary supplements, and water with optimal or higher natural fluoride have a higher risk for this condition. Community water fluoridation is a safe, effective, and inexpensive way to prevent tooth decay, and CDC recommends continuing and extending this practice. Steps can be taken to reduce the potential for enamel fluorosis associated with drinking water and other fluoride products. Learn more about recommendations on [how to reduce the risk for enamel fluorosis](#).