

Fluoride: Water and Supplements



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Fluoride is a negatively charged ion that has a high affinity for calcium-containing structures. When absorbed into the enamel matrix, fluoride forms fluorapatite. Fluorapatite is more resistant to demineralization than the crystalline calcium phosphate found in teeth known as hydroxyapatite. It thus prevents caries in the following 3 ways:

1. It remineralizes tooth enamel.
2. It inhibits enamel demineralization.
3. It also inhibits cariogenic bacteria's acid producing abilities.

AAP Policy recommends pediatricians should screen for and discuss the adequacy of patients' fluoride intake as part of routine health maintenance exams and oral health risk assessment¹. Assessment should encompass a patient's cumulative fluoride intake from all available sources, and direct any necessary preventive education discussions.

Fluoride Sources:

Water

Community water fluoridation comprises one of the most widely available fluoride sources. Water fluoridation alone reduces dental decay by 20-40%, and has been proclaimed as one of the ten great public health achievements of the 20th century. The per-person lifetime cost of community water fluoridation is less than the cost of one dental filling. The CDC recommends fluoridated water contain 0.7 parts per million (ppm) to 1.2 ppm (0.7-1.2mg/L) of fluoride. Community water fluoridation levels vary, thus it is important to know the fluoride content of local water supplies compared to this guideline. In Illinois almost 99% of the population has access to fluoridated drinking water. Chicago and its surrounding communities supplement fluoride at 1.0ppm. Specific information regarding fluoridation levels of other community water supplies can be found at the CDC website (link: <http://apps.nccd.cdc.gov/MWF/CountyDataV.asp?State=IL>). People living in rural areas with private water wells do not have the benefits of optimal water fluoride supplementation. As wide variations in the natural fluoride concentration exist, well water should be tested by contacting the Illinois Department of Public Health's Division of Oral Health for a free testing kit at 217-785-4903 or Stacey.ballweg@illinois.gov.

Pediatricians should know that other water sources (Table 1) commonly consumed by children contain more variable fluoride levels that may significantly affect caries risk.

Source	Fluoridation Level
Commercially bottled waters (unless marked as fluoridated)	No or suboptimal levels (<0.3ppm)
Packaged sterile & distilled water	No or suboptimal levels (<0.3ppm)
"Nursery" water or others marked as fluoridated	Supplemented at 0.7ppm (0.7mg/L);

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Home water filtration systems:	
Reverse osmosis & distillation	Remove fluoride ions
Activated charcoal & cellulose filters (e.g. Brita®, Pur®)	Insignificant affect to fluoride content

Certain sterilized water sources considered by some to be safer for infant consumption similarly contain variable fluoride levels (Table 1). Nursery water should be recommended to families who prefer or need to use bottled water for infant consumption at appropriate ages.

Fluoride Supplementation

The CDC, ADA, and AAP recommend fluoride supplementation for infants and children 6 months to 16 years, according to age, available fluoride sources, and caries risk (Table 2).

Table 2. Recommended Fluoride Supplementation ¹			
Age	Fluoride Concentration in Drinking Water		
	<0.3ppm	0.3-0.6ppm	>0.6ppm
0-6mo	None	None	None
6mo-3yrs	0.25mg/day	None	None
3-6 yrs	0.5mg/day	0.25mg/day	None
6-16 yrs	1.0mg/day	0.5mg/day	None

Infants who exclusively breastfeed deserve special mention as breast-milk contains suboptimal fluoride concentrations. Fluoride supplementation should be prescribed to these infants (6 months and older) until other dietary fluoride sources become adequate. Fluoride containing multivitamin preparations (Poly-vi-flor®, Tri-vi-flor®) are common supplemental options that provide both vitamin D and fluoride to nursing infants.

Recommendations:

1. Children 6 months to 16 years should be assessed for fluoride supplementation.
2. Pediatricians should assess patients' fluoride intake, and educate patients and families regarding appropriate fluoride sources.
 - a. Various bottled water and filtration sources should especially be discussed.
 - b. Formula should be reconstituted using distilled water

This information was originally published in the Fall 2010 issue of the Illinois Pediatrician and was written by William Frese, MD, FAAP and A. Melissa Vargas, DMD., MPH, MSED. A full copy of the article can be found at www.illinoisaap.org/projects/bright-smiles/physician-resources/

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