Fluorine

Physiological Functions

The evidence that fluorine is an essential nutrient has been obtained only from data in animals. The question of whether fluorine is essential to humans has not been resolved. Nevertheless, fluorine has recognized pharmacological benefits that include prevention of dental caries and protection of bone from osteoporosis-induced fracture. Fluoridation of the water supply and addition of fluoride to toothpaste have decreased the incidence of dental caries by 50%. The antibacterial properties of fluorine may contribute to this reduction in dental caries and may also facilitate wound healing.

Factors Affecting Availability

Fluoridated water is the best source of this mineral because it provides a more bioavailable source of the mineral than the protein-bound form found in foods. For dental health, exposure to fluorine through fluoridated water supplies is more beneficial for preventing dental caries than use of topical fluoride rinses.

Deficiency

No cases of fluorine deficiency have been reported in humans. In animals, experimentally-induced fluorine deficiency was found to interfere with feed efficiency, inhibit growth, and reduce life expectancy.

Toxicity

High levels of fluoride in water (2 ppm-6 ppm) can cause mottling, pitting and dulling of teeth. Water fluoride levels greater than 8 ppm can trigger arthritic type of symptoms. Long-term consumption of fluoride above 50 mg daily can contribute to bone and teeth deformities.

- *The upper limit of safety established for fluorine by the Food and Nutrition Board of the Institute of Medicine is approximately 10 mg daily for adults. See table below for age- and gender specific guidelines.*

Fluoride Tolerable Upper Intake Levels	
Life Stage	Fluoride mg/d
Infants	

0-6 mo	.70
7-12 mo	.90
Children	
1-3 y	1.3
4-8 y	2.2
Males, Females	
9-13 y	10.0
14-18 y	10.0
19-70 y	10.0
≥70 y	10.0
Pregnancy	
≤ 18 y	10.0
19-50 y	10.0
Lactation	
≤ 18 y	10.0
19-50 y	10.0

Requirements

The Daily Reference Intakes (DRI) for fluoride are shown in the table below.

Life Stage	**Fluoride** (mg)
Infants	
0 – 6 months	0.01
7 – 12 months	0.50
Children	
1 – 3 years	0.70
4 – 8 years	1.0
Males	
9 – 13 years	2.0
14 – 18 years	3.0
19 – 30 years	4.0
31 – 50 years	4.0
51 – 70 years	4.0
> 70 years	4.0
Females	
9 – 13 years	2.0
14 – 18 years	3.0
19 – 30 years	3.0
31 – 50 years	3.0
51 – 70 years	3.0
> 70 years	3.0
Pregnancy	
< 18 years	3.0
19 – 30 years	3.0
31 – 50 years	3.0
Lactation	

< 18 years	3.0
19 – 30 years	3.0
31 – 50 years	3.0

Dietary Sources

Limited data are available on the fluorine content of food. In plant sources, the fluorine content is a function of the amount found in the soil where the plants are grown. Salt-water fish such as salmon, halibut or orange roughy are good animal sources of fluorine. Concentrated amounts of fluorine are also found in tea leaves. Brewed tea provides 0.3 to1.5 mg of fluorine in an eight-ounce serving.