

# **Systemic fluoride (1 ppm in normal)**

**Lec4**

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The benefits from ingesting fluoride for controlling dental caries have been suggested more than a century ago, Ingestion of excess fluoride, most commonly in drinking-water, can cause fluorosis which affects the teeth and bones. **Moderate** amounts lead to dental effects, but **long-term** ingestion of large amounts can lead to potentially severe skeletal problems. **low levels of** fluoride (1ppm) intake help to prevent dental caries. The dental effects of fluorosis develop much earlier than the skeletal effects in people exposed to large amounts of fluoride.

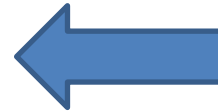


# Dental Fluorosis:

*Dental Fluorosis is a developmental disturbance of dental enamel, caused by excessive exposures to high concentrations of fluoride during tooth development, leading to enamel with **lower mineral** content and **increased porosity**.*



Dental fluorosis is 1-generalized within the dentition and over the entire tooth surface which makes it easy to distinguish fluoride-induced enamel changes from other enamel defects (non-fluoride origin) which may be 2-symmetrically distributed in the oral cavity.



## *According to age and amount of fluoride intake:*

Infants and toddlers are especially at risk for dental fluorosis of the **anterior teeth** since it is during the **first 3 years** of life that the permanent front teeth are the most sensitive to the effects of fluoride (The **central incisor takes approximately 3 years to go through complete enamel mineralization**. Timing of chronic daily fluoride ingestion and the corresponding dental fluorosis pattern that can be expected.). Fluoride accumulates at the **transition/ maturation** stage of tooth development so that the entire tooth surface can be affected. Children fed formula made with fluoridated water are at higher risk to develop dental fluorosis.

1. Child from birth -3year takes excess fluoride from tap water used for infant formula, Incisors, and first molars are most affected teeth.

2. Child from 3–6 years takes excess fluoride from early toothpaste use, premolars, canines and second molars are most affected teeth.

3. Child from 0-6years takes excess fluoride from Fluoride supplements and fluoridated water

(drinking water **>4 ppm** fluoride), all teeth affected.



A **direct** relationship is present between dental fluorosis and level of Fluoride ingested, the severity of dental fluorosis depend on:

- 1. Stage of tooth development.**
- 2. Duration of exposure to fluoride.**
- 3. Concentration of fluoride in foods and drinks.**

Dean in 1942 classified dental fluorosis as follow(*Dean's Classification of Dental Fluorosis*):

Criteria of index.

**Normal 0** Enamel (translucent, smooth, glossy and creamy white)

**Questionable (0.5)** Enamel discolored (slight aberration from the translucency of normal enamel, ranging from a few white flecks to occasional white spot).

**Very mild (1)** Small, opaque, paper, white area scattered irregularly over the tooth, but not involving as much as approximately 25% of tooth surface (no more than 1-2 mm of white opacity at the tip of cusps of bicuspids or second molar).

**Mild (2)** The white opaque areas in the enamel of teeth are more extensive, but not involve as much as 50% of tooth.

**Moderate (3)** All enamel surfaces of teeth are affected and subject to attrition show wear, brown stains is a disfiguring feature.

**Sever (4)** All enamel surfaces of teeth are affected and hypoplasia is so marked that general form of the tooth may be affected, discrete pitting, brown stain wide spread teeth often present a corroded like appearance.



# Pathogenesis of dental fluorosis:

*Dental fluorosis* is related to physiological conditions, including:

1-body weight, 2-rate of skeletal growth and 3-remodeling, 4-nutrition, and 5-renal function.

it is widely known that F- affects the kinetics of bio mineralization, triggering the incomplete mineralization of enamel crystals and producing porous enamel-which is typical of dental fluorosis.

Bone is a reservoir of fluoride, as fluoride is incorporated in the forming apatite crystals, and this ion can also be released from these crystals as bone **remodels**. Therefore, rapid bone growth, as occurs in the growing child, will remove fluoride from the blood stream, possibly reducing the risk of dental fluorosis by lowering serum fluoride levels. Also **Nutrition** is also important for controlling the serum level of fluoride, as ions such as calcium, magnesium and aluminum can reduce the bioavailability of fluoride. A deficiency in these ions in food can also affect (enhance) fluoride uptake.

# Treatment of Dental Fluorosis:

Type of fluorosis	Treatment
Mild	bleaching, to make the color of the tooth surface uniform
Moderate	Composite restorations combined with micro abrasion or application of aesthetic veneers
Sever	prosthetic crowns

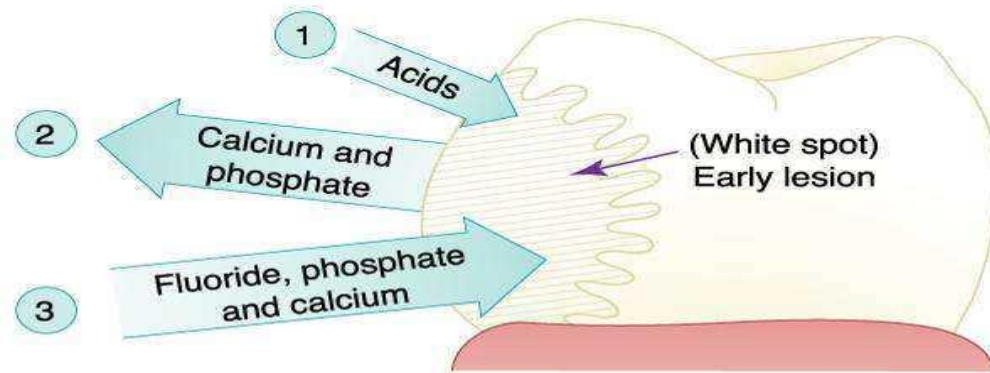


## Incipient Caries and Fluorosis Diagnosis:

It is important to differentiate visually between incipient caries and developmental white spot hypocalcifications (fluorosis) of enamel.

**1. Dental fluorosis is common to observe and is unaffected by drying and wetting. So, a white spot that is an incipient lesion will disappear upon wetting and a hypocalcification will remain whether dry or moist.**

**2. White spot carious lesions usually occur around margins of gingival (the favorable site for plaque deposition)**




1. The tooth is attacked by acids in plaque and saliva.
2. Calcium and phosphate dissolve from the enamel in the process of demineralization.
3. Fluoride, phosphate and calcium re-enter the enamel in a process called remineralization.

# Dental fluorosis and bone fluorosis:

Skeletal or bone fluorosis affects children as well as adults. It does not easily manifest until the disease attains an advanced stage. Symptoms of bone fluorosis:

1. Early symptom include sporadic pain, back stiffness, burning like sensation, pricking and tingling in the limbs, muscle weakness, chronic fatigue, abnormal calcium deposits in bones and ligaments.

2. The advanced stage is **osteoporosis** in long bones and bony **outgrowths** may occur. Vertebrae may **fuse** together and eventually the victim may be **crippled**.



**Generalized dental fluorosis of all the permanent teeth indicates that the bone is potentially a major source of the excess fluoride that causes dental fluorosis in children. People ingesting fluoridated water for many years have higher levels of fluoride in their entire skeletal systems.**

THANK  
YOU