

Fluoride Mechanism and Effects

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2021

Lecture Outline:

- Meaning of fluoride
- Fluoride Sources
- Fluoride and Dentistry
- Mechanism of action
- Metabolism of fluoride

What are fluorides?

Fluoride ion comes from the element fluorine. It is negatively charged and will not remain as a free element. Fluoride has a high affinity for calcium. It is, therefore, very compatible with teeth and bone

Source of Fluoride

- ✓ Ground water: Rain water, sea water and river water
- ✓ Atmosphere: fluoride containing soils and gas
- ✓ Food: certain foods contain more F than others e.g. tea and sea foods.
- ✓ Drugs and fluoride containing dental products. Dentifrices, Fluoride mouth rinse, Professional applied fluorides and Dietary fluoride supplements.

Types of Fluoride Used in Dentistry

- ❑ Systemic fluoride:
 - a. Water fluoridation
 - b. School Water fluoridation

- ❑ Topical fluoride:
 - a. Self- applied fluoride
 - b. Professionally applied fluoride

1.a. Water Fluoridation

Fluoridation is the adjustment of the fluoride in drinking water to the optimal level for reducing tooth decay

Optimal fluoride concentration & climatic conditions.

- In temperate regions – 1 ppm.

Temp in degree Celsius	Recommended ppm
≤18.3	1.1 - 1.3
18.9 -26.6	0.8 - 1.0
≥26.7	0.5 -0.7

Advantage of water Fluoridation

- Safe
- Socially acceptable
- Feasible
- cost effective

1.b. School Water fluoridation

- ❖ Recommended for students are coming only from the area which have low or no fluoride content
- ❖ The recommended concentration for school water fluoridation is 4.5 ppm lead to 40% reduction in caries.
- ❑ **Why concentration of fluoride in school water 4.5 times than community?**
 - ✓ Children spend only a part of their total waking hours in schools.
 - ✓ They enter the school at 6 years of age. Thus, the incisors are no longer at risk of dental fluorosis.
 - ✓ Only part of daily water intake is consumed.

2.a. Self-applied fluorides

- ❖ It is benefit in post eruptive phase: Dentifrices, Fluoridated mouth rinse, Fluoridated gel.

2.b. Professionally-applied fluorides

- ❖ gel foam, varnishes, prophylactic paste or pumice. Many types of fluoridated agent used, mainly: Sodium fluoride (NaF), Stannous fluoride (SnF₂), Acidulated phosphate fluoride
- ❖ **Choice depend on:**
 - ✓ Current levels of fluoride intake
 - ✓ Caries status
 - ✓ Age of subject in the area

Mechanism of action

- Decrease solubility of enamel in acid by converting hydroxyapatite into less soluble fluorapatite.
- Enhance remineralization of enamel in areas that have been demineralized by acid.
- Antibacterial action: Bactericidal in high concentration and bacteriostatic in low concentration. Fluoride affect oral bacteria and dental ecology. It inhibits bacterial adsorption and decrease acid production of plaque bacteria.
- Improve tooth morphology making them more self-cleansing.

Metabolism of fluoride

- Absorption by stomach----- Reach to peak after 30 min-----Return to normal 11-15hr----- (bone and teeth 99%)-----Excretion by kidney

Side effect of fluoride

- Dental fluorosis
- Reversible gastric disturbance
- Skeletal fluorosis
- Death

