



What is the Fluoride

Fluoride: is the ionic form of the fluorine element that is essential for development of our bones and teeth, also has optimal and beneficial effects on prevention of dental caries.¹

Fluorine 9
F
18.998

Dietary sources:

It is mainly found in drinking water, tea, leafy vegetables, and richly found in seafood.

Daily requirements

Adults (1-2 ppm) or (1.5-4 mg/day).

Children (0.6-0.9 mg/day).¹

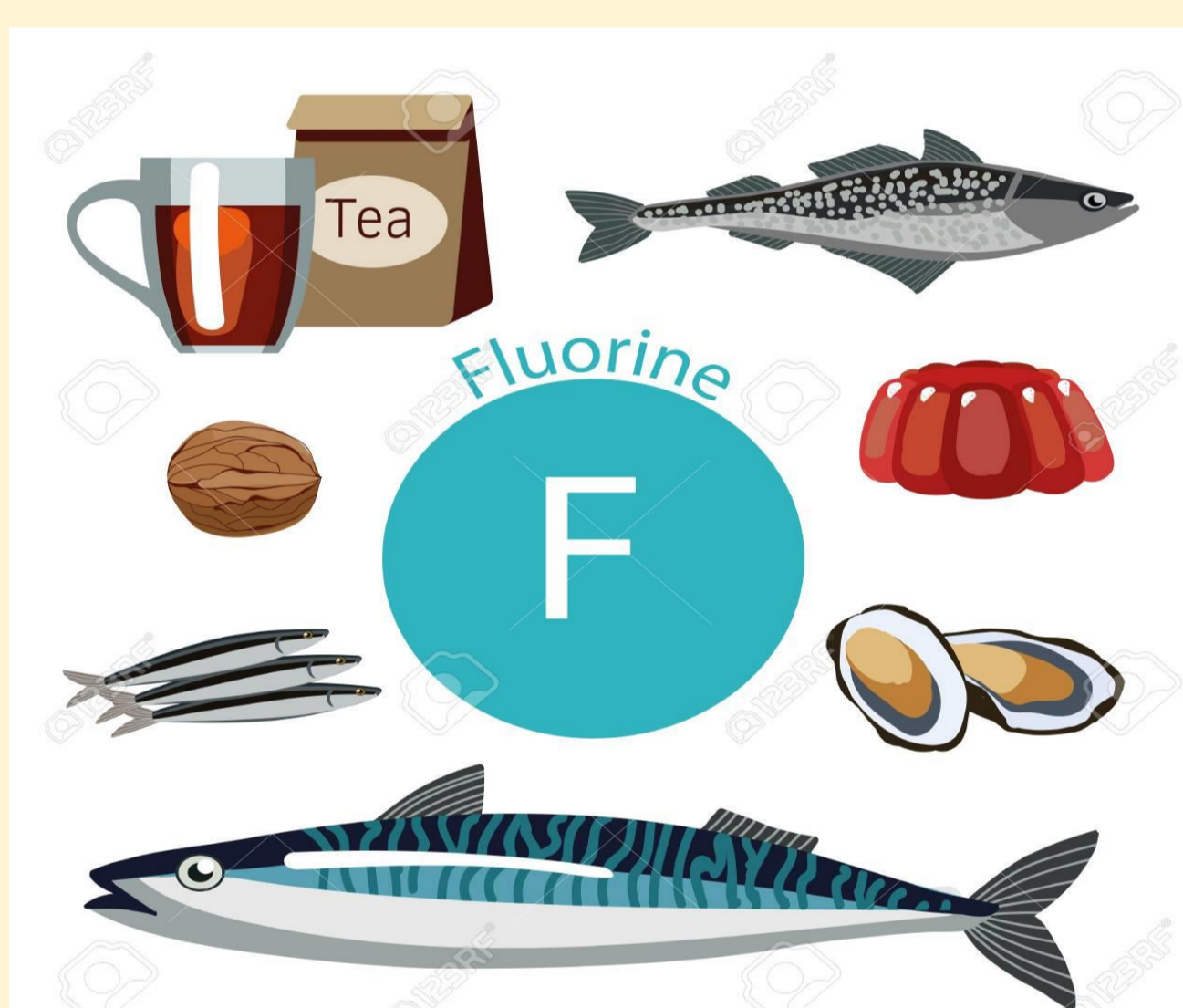


Fig.1 showing the dietary sources of fluoride.

Types and forms

• systemic fluoride:

- Fluoridated water .
- Dietary fluoride supplements (tablets, drops, or lozenges) .
- Salivary secretions¹



Fig.2 showing the applied drops as a fluoride supplement.

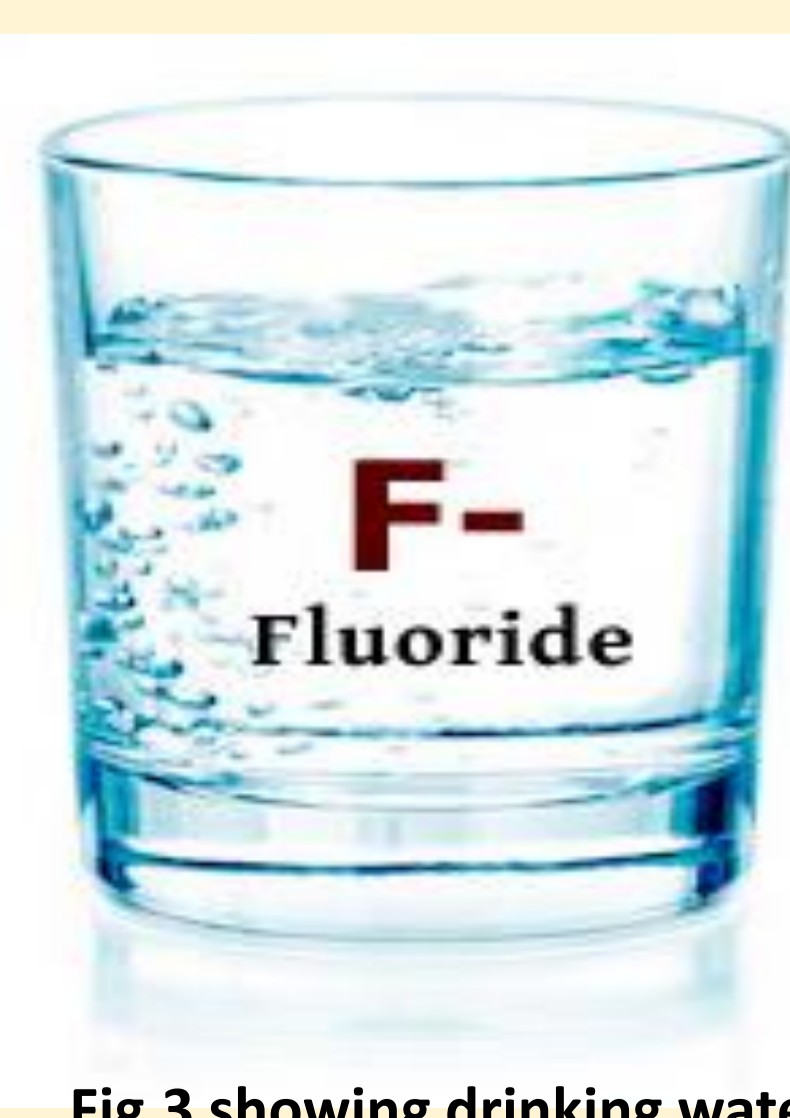


Fig.3 showing drinking water as a systemic fluoride source.

• Topical fluoride:

- Toothpaste (dentifrice).
- Mouth washings.
- Fluoride applied in dental office.²



Fig.4 (A), (B), and (C) showing examples of topical fluoride.

Mechanism of action

The fluoride has anti- cariogenic effect and that by these possible actions :

- (1) Conversion of calcium hydroxyapatite [Ca₁₀(PO₄)₆OH₂] into calcium fluorapatite [Ca₁₀(PO₄)₆F₂], this occurs via substitution of hydroxyl group leading decrease solubility of enamel in acid produced by bacteria making it more resistant to caries.
- (2) remineralization of enamel that already has been demineralized by bacterial acids.
- (3) prevents acid (lactic acid) production by inhibition of enolase enzyme (glycolytic pathway) in bacteria!¹

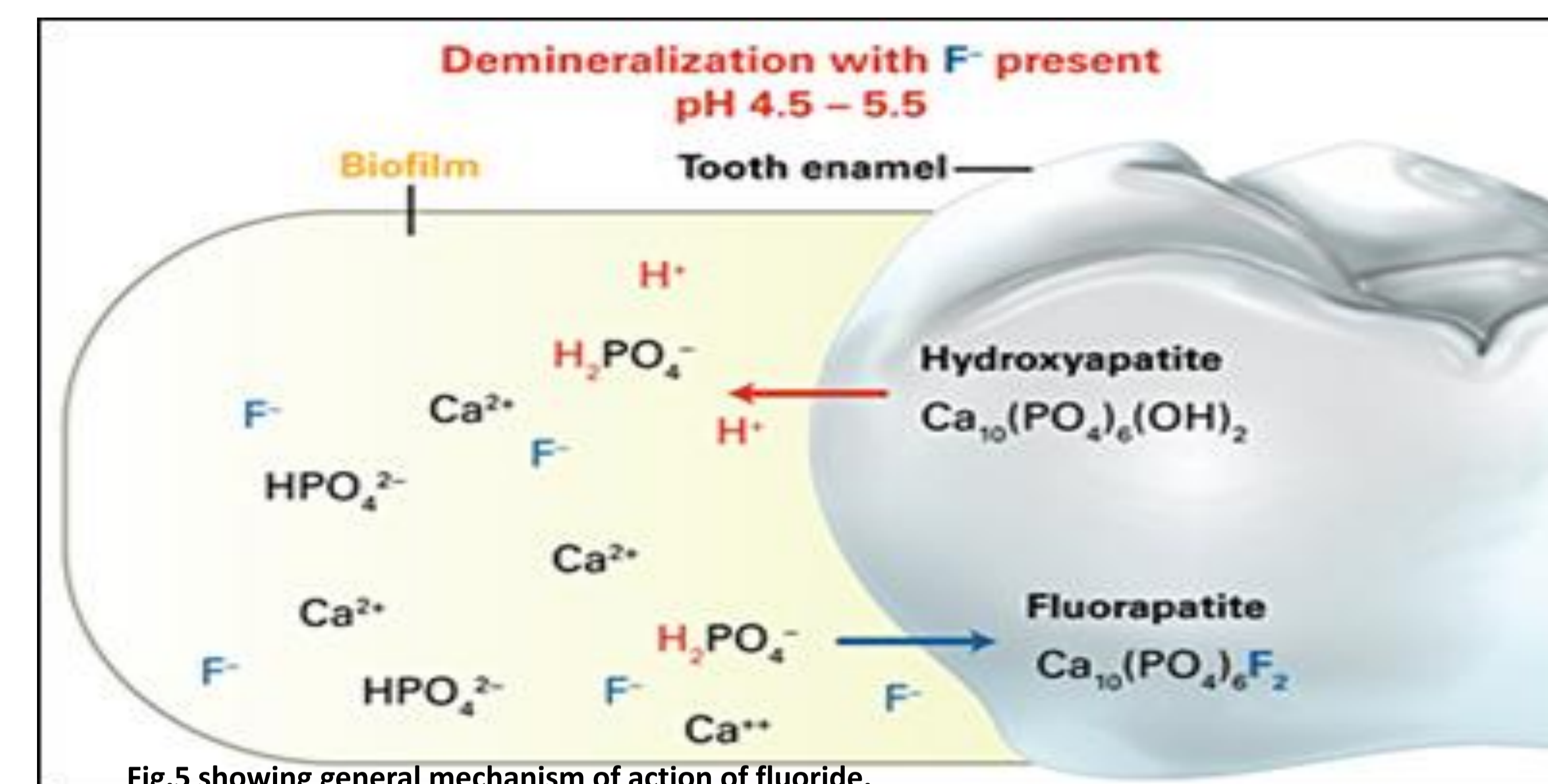


Fig.5 showing general mechanism of action of fluoride.

Toxicology

The prolonged use of fluoride at recommended levels does not produce any harmful physiological effects, however; there are safe levels for F beyond which harmful effects can occur.

And that can be classified as:

- 1) Acute toxicity :** occurs due to single ingestion of a large amount of fluoride and it is very rare condition, the lethal amount of F taken orally is (35-70 mg F/kg body weight).
- 2) Chronic toxicity:** long term ingestion of smaller amounts of F in drinking water (2-8 mg/daily) lead to skeletal fluorosis, slowly increase bone density and the joints become stiffen and painful.³

Conclusion

Fluoride is a natural element that strengthens teeth and prevent their deterioration, however; it can also be harmful if not properly monitored and carefully used.

Dental health professionals need to remain informed about the latest research of fluoride effects in order to understand and apply the beneficial effects of fluoride and avoid its toxicity.

References

- (1) Harris NO, García-Godoy Franklin. *Primary Preventive Dentistry*. Upper Saddle River, NJ: Pearson Education; 2004.
- (2) The Superhero That Lives Inside Your Mouth. Mouth Healthy TM. <http://www.mouthhealthy.org/en/fluoride-superhero>. Accessed January 17, 2019.
- (3) Dhar V, Bhatnagar M. Physiology and toxicity of fluoride. *Indian Journal of Dental Research*. 2009;20(3):350. doi:10.4103/0970-9290.57379.