

Fluorides in clinical dentistry

Dr. V.K. Gopinath M.D.S., PhD

University of Sharjah

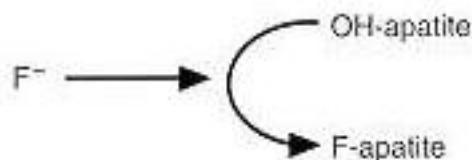
Introduction

- Dental caries: a substrate-dependent, infectious, multifactorial disease but preventable disease.
- Enamel subjected to a continuous process of demineralisation - remineralisation

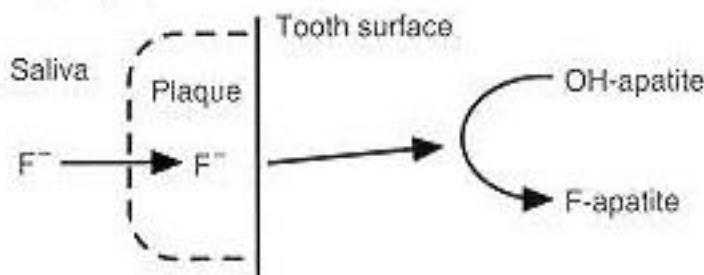
Fluoride

- Constant exposure of F:
 - Enhanced remineralisation
 - Inhibited demineralisation
 - Antimicrobial effects: inhibit glycolytic pathway

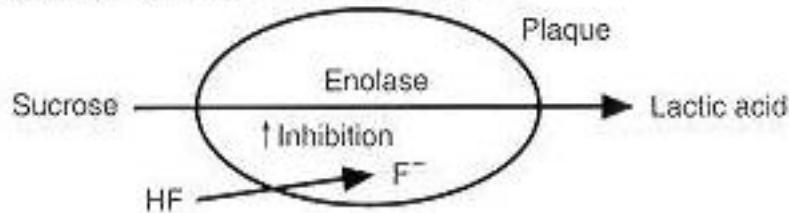
1. Tooth mineral is made less soluble by the formation of fluorapatite during development



2. Fluoride in saliva and plaque promotes remineralization of tooth surface after tooth eruption



3. Fluoride in plaque enters bacterial cells, especially at low pH, and inhibits enolase, thereby reducing acid production in plaque.



Fluoride

Fluoride can act in two ways:

- Pre-Eruptive (while teeth are forming)
- Post-Eruptive (intraoral)
- Predominant effect of fluoride is topical rather than systemic

"Adequate but not excessive of Fluoride during tooth formation is beneficial in caries prevention. However, continuous intraoral exposure to Fluoride is essential for continuous caries prevention" (Rugg-Gunn, 1999)

Fluoride

- **Systemic use of Fluoride:**

- Water (1 ppm) or (1mg F/l water)
- Salt (250mg F/Kg)
- Milk (2.5-5 mg /l)
- Supplements (0.25 mg , 0.5mg & 1mg)

- **Topical use of Fluoride**

- Tooth-paste (500ppm, 1000ppm)
- Mouthwash
(0.09% daily or weekly Sodium fluoride)
- APF gel 1.23% (three or six months, four minutes)
- F gel/paste (0.5% fluoride, home use , application twice daily)
- F varnish (DURAPHAT 5% NaF twice per year)

* 5% = 22,500ppm , 2% = 9000ppm , 0.2% = 900ppm , 0.05% = 225ppm

Fluorides in clinical dentistry

- Self- administered
 - 1. Fluoride tooth paste
 - 2. Fluoride supplements
 - 3. Fluoride mouth rinses
- Professionally applied fluorides

Fluoride gels and varnishes

- Fluoride over dosage

F Toothpastes

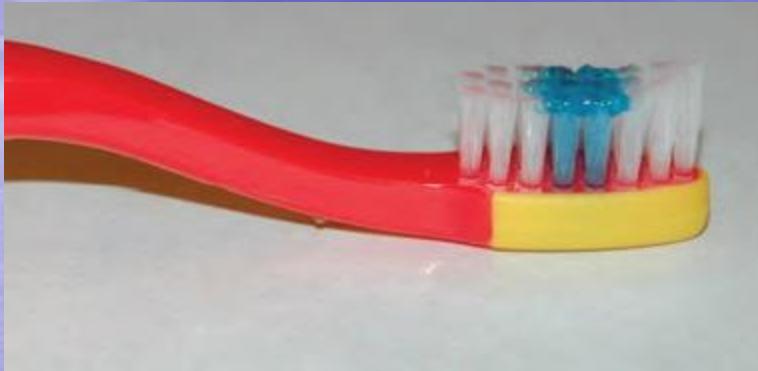


Recommended schedules for Fluoridated Toothpaste

- Baseline frequency:
 - Twice daily brushing with a fluoride toothpaste beginning before the age of 2 years remains cornerstone of preventive advice for whole population
 - Use LOW concentration F for children 2-6 years of age (400-500 ppm F) and Spit not rinse ?

Considerations for F toothpaste use in infants and children

- Parents should brush their child's teeth & supervise closely until the age about 6-8 yr old
- Children under 6 yr old ingest 30% toothpaste used, use smear/ pea size amount of toothpaste
- Commence toothpaste use around 2 years of age (Australian Guideline)
- Low F toothpaste (400-500 ppm F) for infants & young children (before eruption of permanent central incisors) in those living in optimally F areas
- Children more than 6 years and are at high risk to dental caries are encouraged to use tooth paste containing 1000 ppm of fluoride.



Smear amount



Pea-sized amount



Concentrated F
products in excess of
1000ppm should not
be prescribe for
home use

F Mouth wash



Fluoride mouth rinses

- Contraindicated in children less than 6 years of age because of the risk of ingestion.
- Available as neutral sodium fluoride, acidulated phosphate fluoride
- This is a simple way to expose the tooth to fluoride.
- Clinical trials with fluoride rinse proved to reduce caries by 20 – 50 %

Home use of fluoride rinses daily or weekly

Sodium fluoride	Fluoride ion%
Sodium fluoride 0.2%	0.09

Professionally applied fluorides

- Fluoride gel
- Fluoride varnish

Fluoride Varnish

- Fluoride varnish is simply brushed onto the clean and dried teeth (it is quick).
- The varnish sets on contact with saliva leaving a sticky covering. Varnish dissolve slowly over several days, which provides maximal absorption of fluoride into the tooth enamel and minimal risk of fluoride ingestion
- Products
 1. 5% Sodium fluoride varnish (2.26% Fluoride ion)

Fluoride varnish/ Fluoride gel



Fluoride varnish application



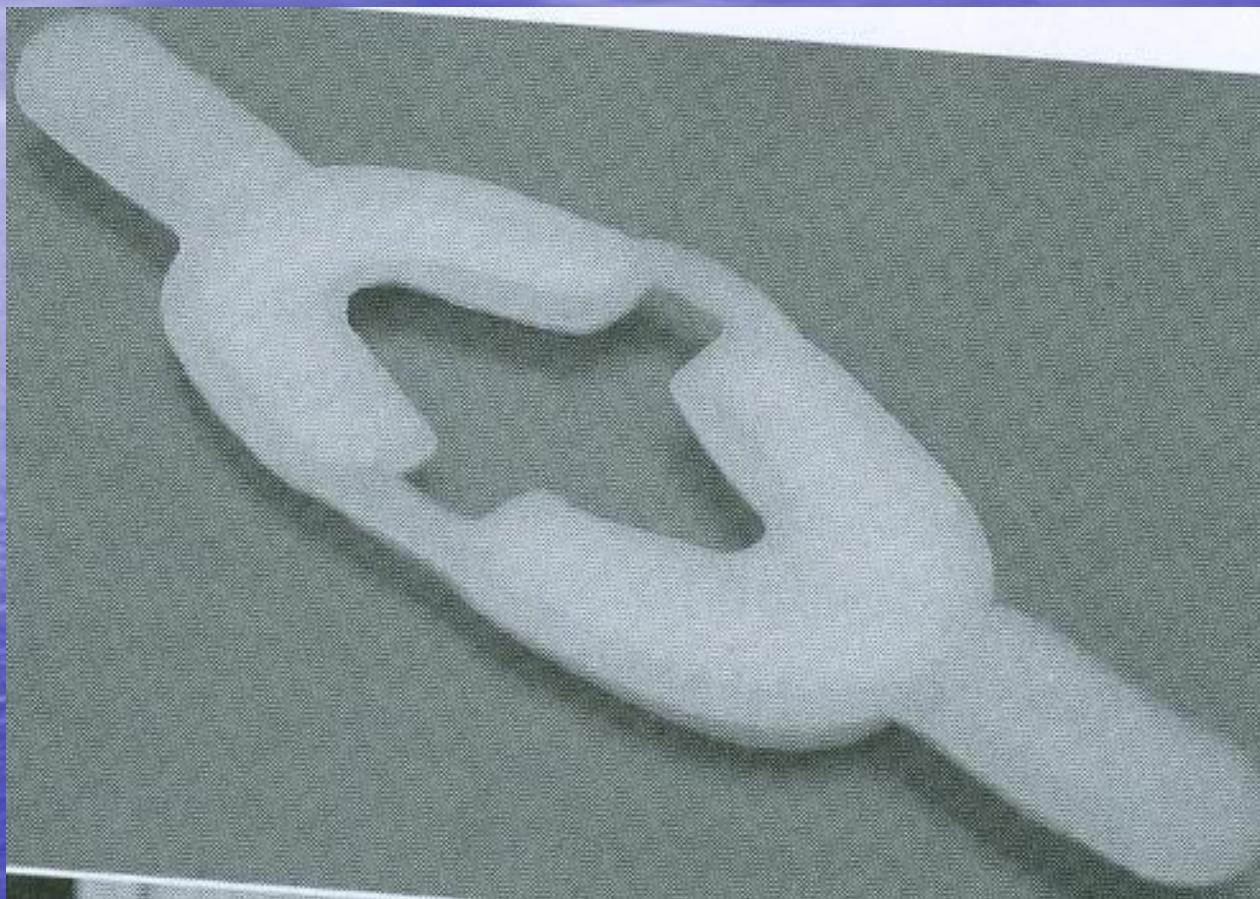
APF gel Application 1.23%

- Not recommended for children less than 6 years as there is no benefit and risk of swallowing APF gel.
- Recommended from 6 – 18 years every three to six months for four minute application.
- Prophylaxis before 1.23% fluoride APF gel application is not necessary for coronal caries prevention in all age groups.

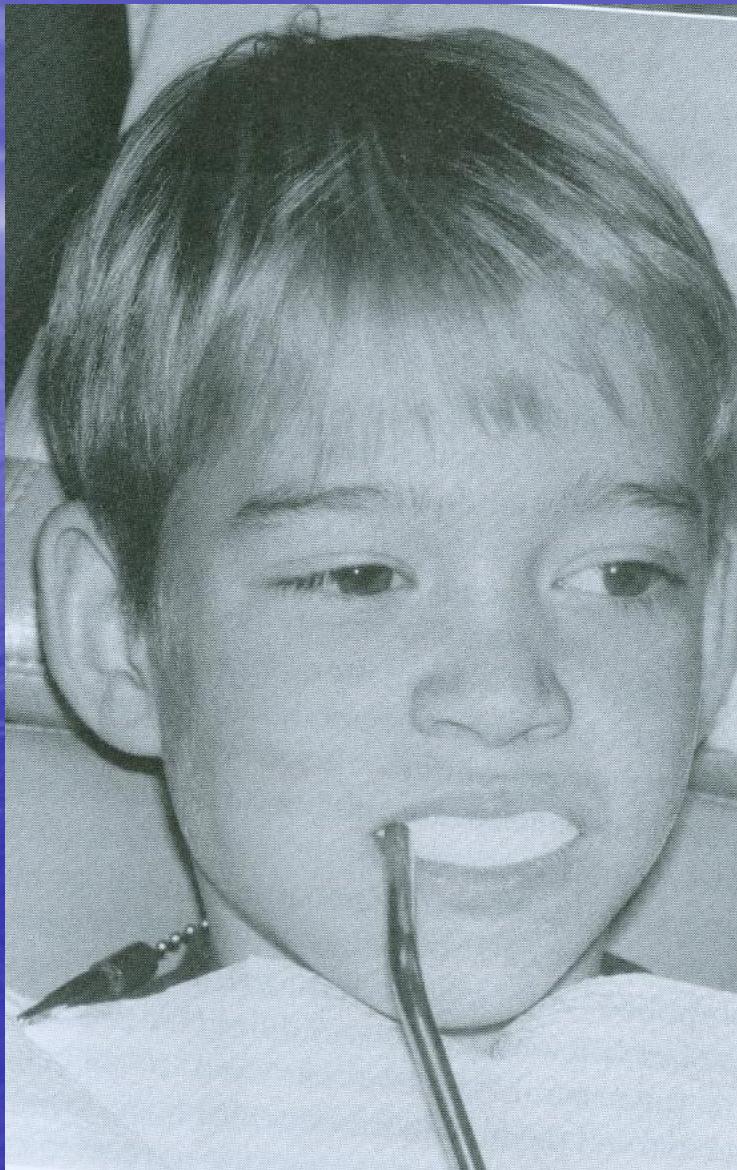
Application of APF gels using tray technique

- Insert both upper and lower trays at the same time in to the mouth.
- Application time is 4 minutes.
- Patient sits upright and head tipped forward and use high velocity saliva evacuation.
- Patient to expectorate for 1 minute after treatment.
- Patients instructed not to eat or drink for 30 minutes after application.
- Applications are recommended every three to six months in a year.

Trays for application of fluoride gels



Fluoride application the tray and gels



Fluoride supplements

- In the form of either drops or tablets
- Indicated in high risk children in whom dental disease would pose a risk to general health e.g. children at risk of endocarditis.
- Only effective if given for a long time regularly

F Supplement

- Is it needed?
- Consider
 - Caries risk
 - Age of child
 - Other sources of F
 - Take a F inventory before recommending a supplement

Fluoride Inventory

Infants

- Breast feeding exclusively/partly
- Formula use - soy/ milk
- Usual water source- tank/ bottled/ bore
- Baby food used at home-made/ commercial
- Cultural feeding habits/practices

Preschool children

- Usual water source
- Is water fluoridated?
- Preparation of foods
- Type of toothpaste used
- F supplement
- F mouthrinse
- Professionally applied F
- Current medications
- Cultural feeding habits/practices

Considerations in fluoride therapy for infants and children

- Prescription of fluoride:
 - Consider fluoride as a drug, treat it with respect
 - Assess caries risk, consider age of child
 - Benefit (caries preventive effects) vs risk (dental fluorosis and F toxicity)
- F therapy must be provided along with other preventive aspects of caries control
 - Changes in behaviour and diet

F Supplement: Recommended dosage

Age Interval	Domestic water F concentration	
	< 0.3 mg/L	0.3-0.5mg/L
6 months to 4< years	0.25mg (Single dose per day)	0
4-8 years	0.5mg (0.25 mg twice a day)	0.25mg
8 years +	1.0mg (0.5 mg twice a day)	0.5mg

Clinical Recommendations (*Weyant et.al., 2013*
JADA 2013;144(11):1279-1291)

- Fluoride tooth paste <500 ppm F twice daily smeared amount in children less than 6 years and 1000ppm of fluoride paste 6 years and above twice daily
 - 2.26 percent fluoride varnish or 1.23 percent fluoride (APF) gel; or prescription-strength, home-use 0.5 percent fluoride gel or paste or 0.09 percent fluoride mouthrinse for patients 6 years or older.
 - Only 2.26 percent fluoride varnish is recommended for children younger than 6 years.

Fluoride over dosage

- Minimum dose that could cause acute toxic signs and symptoms is called the **probable toxic dose (PTD)** . Dose of 1 mg of F/kg body weight can be enough to produce symptoms of toxicity
- PTD is set at 5 mg per 1 kg body weight per day.
- Gastrointestinal symptoms in children can begin at 3-5mg per 1 kg body weight.
- **Certain lethal dose** for human = 32-60mgF per 1 kg body weight.

Symptoms of Fluoride toxicity:

- **Nausea, vomiting, hypersalivation, abdominal cramps, diarrhoea, convulsions, cardiac and respiratory failure.**

Treatment of Fluoride poisoning:

- Know the type of fluoride ingested, concentration of fluoride, amount and time consumed and persons size and weight.
- Minimise further absorption by administering calcium products eg., calcium gluconate, milk or antacids containing calcium carbonate.
- Do not induce vomiting.
- Monitor vital signs and seek medical attention ASAP.

Dental fluorosis

- Increased fluoride concentration within the microenvironment of the ameloblasts during the period of enamel formation.
- A daily dose higher than 0.05mg of F per 1 kg body weight per day for children with developing teeth can lead to risk of fluorosis.

Eg: A) 1 year old weight 5 Kg= the max dose 0.25mg F ion per day.

B) 2 year old weight 10Kg= the max dose 0.5mg F ion per day.

C) 4 year old weight 15 Kg= the max dose 0.75mg F ion per day.

Fluorosis: is it really a problem?

Dean :

- Very mild - only pose cosmetic problem
- Moderate : very white, chalky, opaque enamel
- Severe: mottling and loss of portions of outer enamel- staining of enamel

Fluorosis : Clinical management

- Mild fluorosis
 - Surface remineralisation
 - CPP-ACFP (Tooth Mousse)
- Defective enamel surface
 - Remove microabrasion:
 - Dilute hydrochloric acid / 35% Phosphoric acid and pumice paste, followed by remineralisation with topical F or artificial saliva
 - Restorative replacement of affected discoloured enamel:
 - Composite resin buildup
 - Veneers- Composite / porcelain

Summary

1. When used appropriately, F is safe and effective agent
2. Use of F must be considered on risks vs benefits
3. F therapy must be provided along with other preventive aspects of caries control

The background of the image is a wide-angle photograph of a serene ocean. The water is a deep, vibrant blue, with small, gentle ripples across its surface. Above the horizon, the sky is a lighter shade of blue, dotted with wispy, white clouds that are more concentrated towards the top left of the frame.

Thank you