

Self-applied fluoride products are usually brought and dispensed by the individual patient but at the recommendation of a dental professional. These fluoride products are of low concentration ranging from 200-1000 ppm or 0.2-1 mg/ml.

**These self – applied fluorides are:**

1. Fluoride dentifrices.
2. Fluoride mouth rinse.
3. Fluoride gel.

**Requisites for self-applied fluoride agents: [community and individuals]:**

- Should be completely safe.
- Should be effective for preventing caries.
- Method should be suitable for use by large groups and at a reasonably low cost.
- Should be acceptable to participants.
- Should be easy to use to ensure compliance.
- Should require few professional personnel.
- Should be able to be supervised by non-dental personnel after short periods of in-service training.

**1. Fluoride Dentifrices**

Fluoride adding fluoride to tooth-paste has been carried out since 1945 and covers a wide range of active ingredients in various abrasive formulations. Compounds that have been tested for caries-inhibitory properties include sodium fluoride, acidulated phosphate fluoride, stannous fluoride, sodium monofluorophosphate and amine fluoride. Most toothpaste nowadays contain **sodium fluoride or sodium monofluorophosphate** as active ingredient, usually in concentration of 1000–1100 mg F/g.

## **Fluoridated Toothpaste for Children**

✓ Concern about the fluorosis risk from children swallowing toothpaste has led to trial of lower-strength dentifrices. Findings from studies of 500–550 mgF/g products suggest efficacy equivalent to 1000 mgF/g toothpaste.

✓ Since children can swallow between 0.12 and 0.38 mg of toothpaste per brushing, lower fluoride toothpaste may reduce the risk of fluorosis while substantially retaining the caries preventive benefits.

✓ The production of candy like flavors and toothpaste containing fluoride at 1500 ppm or more should not be encouraged for use by children, as it may lead to an excessive ingestion of fluoride.

## **Toothpaste Formulations**

Most 1000 ppm fluoride containing toothpaste achieve this concentration, i.e. [0.1%F= 1 mgF/g paste] by adding one of the following fluoride salts.

- Sodium fluoride [0.2% NaF]
- Sodium monofluorophosphate [0.76% Na<sub>2</sub>PO<sub>3</sub>F]
- Stannous fluoride [0.4% SnF<sub>2</sub>]

Stannous Fluoride toothpaste has one major disadvantage that they lead to unsightly black/ brown extrinsic staining of tooth surface, specially around margins of tooth colored restorations. The discoloration is probably due to precipitation on the acquired pellicle of oxides and sulphides of tin.

- Both sodium fluoride and sodium monofluorophosphate dentifrices can be recommended freely as available evidence fails to support the superiority of one fluoride over the other. *A unique characteristic of sodium monofluorophosphate is its compatibility with a wide variety of dentifrice abrasive system.* In contrast to other fluoride compounds such as stannous fluoride, which are almost completely dissociated in aqueous solution to yield

fluoride ions that readily react with available cations, the fluoride in sodium monofluorophosphate remains largely complexed as  $\text{PO}_3\text{F}^-$  in solution. This fluoride complex is compatible with a wide variety of abrasive system. By far the greatest number of dentifrices on sale in the world today has sodium monofluorophosphate (MFP) as their active ingredient.

### **Mechanism of Action of sodium monofluorophosphate (MFP)**

Two possible mechanisms have been suggested. One suggests that MFP ions is incorporated into the hydroxyapatite crystal lattice with a subsequent slower release of fluoride ion which then replaces hydroxyl groups to form fluorapatite.

On the other hand it is suggested that it is MFP ions itself which is incorporated into the apatite crystals by means of a substitution reaction with one or more of the phosphate groups.

*Fluoride in toothpaste is taken up directly by demineralized enamel and it also increases the fluoride concentration in dental plaque, thus leaving a store of fluoride available for remineralization when pH drops.*

### **Manner of Use of Fluoridated Toothpaste**

- Fluoridated toothpaste should be used daily for tooth cleaning by person of all ages to control development and progression of dental caries.
- In children under the age of 6 years, brushing should be supervised in order to prevent excessive ingestion.
- In children only a very small amount (less than 5 mm) which approximates the “pea size” should be placed on the brush.

## 2. Fluoride Mouth rinses

Frequent use of low concentration of fluoride is more cariostatic than less frequent use of higher concentration of fluoride for topical application. In areas where water fluoridation is not possible or has not been implemented, the fluoride mouthrinses have been found to be an effective tool in prevention of dental caries. Over the past few decades fluoride mouthrinsing has become one of the most widely used caries-preventive public health measure.

Sodium fluoride mouth rinse is now widely used in school based programs as well as by individuals at home. Other less extensively tested fluoride mouth rinses include those containing APF, stannous fluoride, ammonium fluoride and amine fluoride. Caries reduction by 30 %.

*For reasons of lowest expense, convenience in handling as well avoidance of unpleasant taste, NaF became the most widely used of these tested products in public health programs.*

### Recommendations

✚ Mouth rinses designed to be rinsed and spit out, either prescribed by the dentist.

✚ The American Dental Association recommends the use of fluoride mouthrinses, but not for children under six years of age because they may swallow the rinse.

✚ In communities with fluoridated water supplies or with natural occurring optimum fluoride level in drinking water, mouth rinsing programs would give a super added benefit.

✚ Over-the-counter daily fluoride mouthrinses generally contain 0.05 % NaF (200–220 ppm F). A 10 mL volume should be swished around the mouth vigorously once each day for one minute (ideally just before bedtime) and then expectorated. Patients should not rinse afterwards for 30 minutes. Pharmacy-only “weekly fortnightly” fluoride mouthrinses typically contain 0.2 percent NaF (900 ppm F).

They are designed to be used under adult supervision, once each week for one minute.

✚ Fluoride mouthrinse should be used at a time of day when toothpaste is not used, and it should not be a substitute for brushing with fluoridated toothpaste. After rinsing, mouthrinse should be spat out, not swallowed.

### **Indication**

1. Patient with low salivation and high caries level because of systemic disease, use medication, surgery, radiotherapy.
2. Patient wearing orthodontic appliance which act as traps for plaque accumulation.
3. Patient unable to achieve good oral hygiene.
4. Patient with gingival gum recession and susceptible to root caries.
5. Patient with rampant caries.

### **3. Fluoride Gel .**

Many fluoride gels have been become available recently. Fluoride gel contain component formulated in a non-aqueous gel base that does not contain an abrasive system. It contain:

1. Stannous fluoride 0.4% equal to 1000 ppm.
2. Sodium fluoride 1.0% equal to 5000ppm.

### **Recommendations**

- ✓ Use as tooth brushing with gel as the use of dentifrices(allowing the gel to remaine in the oral cavity for 1 minute and then expectorate).
- ✓ Use as alternative to the use of fluoride rinses and adjunct to the use of professional topical fluoride application and dentifrices to achieve caries control in patient who are especially prone to caries formation as patient with rampant caries.

✓ Restricted use only to the period required to achieve caries control like fluoride rinses.

✓ Fluoride gel is not substitute to dentifrices, but it use in combination

### **Fluoride exposure from multiple sources**

❖ Fluorides are found naturally throughout the world. They are present to some extent in all foods and waters so that all humans ingest some fluoride. This can be extremely beneficial in terms of the prevention of dental decay.

❖ Multiple fluoride therapy → fluoride combination programs included application of fluoride in dental clinic in form of topical applied fluoride and fluoridated prophylactic past use and the home use fluoride dentifrices in addition to systemic ingestion of fluoride (communal water fluoridation).

❖ This combination programs between systemic and topical fluoridation may give about 75% reduction in dental caries.

### **Fluoride and Tooth erosion**

Tooth erosion is the term used to describe tooth wear caused by acid (extrinsic and intrinsic acid) that is not of bacterial origin, leading to painless and irreversible loss of hard tooth tissue. This phenomenon should be early diagnosed in children and adult to stop its progress. Fluoride use to formation of a protective layer on dental hard tissue , which compose calcium fluoride ( $\text{CaF}_2$ ) in case of amine fluoride and sodium fluoride or of metal rich surface precipitate in case of stannous fluoride, appear to be most effective on enamel. There is convincing evidence that fluoride in general can strength teeth against erosive acid damage. The uses of high concentration fluoride agent and/or frequent application are considered potentially effective in prevention of dental erosion.