Fluoride Products - Comparisons and Precautions

L0054 - 3 credits

Manual and Test developed by:
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P = Purpose
S = Survey
Q = Question
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1. Determine your **purpose** for reading this course. For many of you it may be merely to obtain continuing education credit to maintain your license. But, take a moment and look beyond this reason, what is it about this particular course topic that interests you? How does it relate to your current practice? (Est. Time - 5 minutes)

2. Test your knowledge of the course subject matter prior to reading the course by answering the course examination questions at the back of the booklet. Circle the answers in the course booklet, or write the answers on a separate sheet of paper. Do not use the FasTrax answer sheet for the pretest. (Est. Time -20 minutes)

3. **Preview** the course by surveying or skimming the course objectives, subject headings, illustrations, graphics and test questions. Pay attention to the first sentences, introductions, conclusions or summaries in the course. Write down any words that are unfamiliar to you. (Est. Time -15 minutes)

4. Make up **questions** using the section headings as a guide. Write the questions on a blank sheet of paper and leave space for your answers (2-3 inches). For example, if the section heading states "Diagnosis of Alzheimer's Disease", write the question "What are the current criteria used to diagnose Alzheimer's disease?" leaving space for the answer later on. (Est. Time -15 minutes)

5. **Read selectively** to find the answers to your "section-heading" questions. Write your answers in the space you provided. Be sure to write down and/or look up any words that are or were unfamiliar to you. Also, as you continue to read don't forget to look for ideas and information that are in alignment with your purpose for taking the course. (Est. Time - 80 minutes)

6. **Recite** the answers to your questions, by reading the question aloud with the answer covered up. Use your own words as much as possible. If you don't recall the answers, look over that section again. (Est. Time - 5 minutes)

7. **Reflect** on the information in the section you've just read. Try to make a simple outline, table, flow diagram or "doodle". (Est. Time - 5 minutes)

8. **Review** "section-heading" questions and answers, diagrams and outlines. (Est. Time - 15 minutes)

9. Take the Course Examination. Place your answers on the FasTrax answer sheet inserted with your course packet. (Est. Time - 30 minutes)

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Normal Estimated Time to Complete this GSC Home Study CE Course Activity

Take the pretest	20	minutes
Read the course	90	minutes
Take the post-test	30	minutes
Re-read the course to locate answers	35	minutes
Complete the course evaluation	5	minutes
TOTAL time	180	minutes

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Determine the Purpose for taking the course	5	minutes
Take the pretest	20	minutes
Preview the course	15	minutes
Make up questions	15	minutes
Read selectively	80	minutes
Recite the answers to your questions	5	minutes
Reflect the information you just read in the course	5	minutes
Review questions, diagrams, and outlines	15	minutes
Take the posttest	30	minutes
Complete the course evaluation	5	minutes
TOTAL time using the PSQ4R method	195	minutes

Use the method you think will be the better use of your time.

TABLE OF CONTENTS

COURSE OBJECTIVES

At the completion of this course, the dental professional should be able to:

1. Demonstrate an understanding of the mechanisms of fluoride.

2. Demonstrate knowledge of the four types of professionally applied fluorides, including advantages and disadvantages.

3. Identify the three types of fluoride varnishes currently FDA- approved for limited use in the United States; describe and compare their efficacy and safety.

4. Demonstrate knowledge of first-aid and medical management in the rare event of acute fluoride toxicity.

5. Demonstrate an understanding of cautions regarding the recommendation or prescription of fluorides for home-care use and application by patients.

6. Demonstrate an understanding of the differences between the fluoride-containing home-care products, including toothpastes, chewable tablets and self-applied rinses and gels.

Acknowledgment
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INTRODUCTION

This course is designed as a refresher for dental professionals desiring information on comparisons and efficacy of fluoride for caries prevention and tooth remineralization. Those wishing to study additional material on early childhood dental conditions may wish to consult other GSC courses currently offered, including: *Children's Oral Health: Caries Prevention, Nutrition and Fluoride; Children's Teeth at Risk - Oral Health Concerns: Baby Bottle Tooth Decay, Nonnutritive Sucking Habits and Nail Biting; and Dental Sealants.*

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MECHANISMS OF FLUORIDE

Current research indicates that fluoride is most effective when a low level is maintained in the oral cavity at all times. Fluoride has been shown to enhance enamel remineralization and to inhibit demineralization during the carious process.

Fluoride is stored in plaque and released in response to the acidic environment of the oral cavity. In the presence of appropriate levels of calcium and phosphate ions, fluoride has been demonstrated to reverse enamel demineralization. Fluoride in dental plaque is known to inhibit glycolysis, the process by which fermentable carbohydrate is metabolized by cariogenic bacteria to produce acid.

Additional mechanisms of fluoride action include bacteriacidal effect at higher concentration and formation of a temporary layer of calcium fluoride. One bacterial effect is that it makes streptococcus mutans less acidogenic.

PROFESSIONALLY APPLIED FLUORIDES

Professionally applied products used in the dental office contain high concentrations of fluoride, either 2 percent or 1.1 percent sodium fluoride (NaF), 1.23 percent acidulated phosphate fluoride (APF) or 8 percent stannous fluoride (SnF). Varnishes with a 5 percent concentration of sodium fluoride or

one percent defluorsilane have been approved by the FDA for desensitization of teeth only.

Sodium Fluoride (NaF)

Neutral sodium fluoride has an acceptable taste, does not stain teeth or affect existing restorations and does not irritate oral tissues. NaF gels have been marketed as a safe alternative to APF for patients having numerous prosthetic restorations.

Clinical studies of NaF solution have demonstrated it to be effective when used in a series of four or five initial applications. This method, although initially time-consuming for the operator and the patient, may significantly complement a plaque control program.

Neutral sodium fluoride gels can be used as an alternative to APF to avoid etching of porcelain and composite restorations. The use of prophy paste containing neutral sodium fluoride is commonplace. The dental health professional should note that these pastes are not necessary when a topical fluoride is applied. Neither the practice of using fluoride-containing prophy paste as a substitute for topical application nor the one-minute application of 1.23 percent APF is supported by research.

Acidulated Phosphate Fluoride (APF)

APF is the most commonly used topical fluoride in the dental office because of its storage stability, acceptable taste, tissue compatibility and nonstaining characteristics. It has been shown to be effective when administered twice annually in four-minute applications or more frequently for patients with high caries incidence. While prior prophylaxis is not necessary, fluoride is generally applied at recall visits following a prophylaxis. Research shows that the one-minute application of 1.23 percent APF demonstrates a 50 percent to 60 percent uptake of fluoride.

The main disadvantage of APF is its low pH tends to etch porcelain and composite restorative materials. Varnish or petroleum jelly placed over these materials may protect them during fluoride application.

Time-saving APF foams requiring a one-minute application are comparable to the four-minute gel application in enamel uptake. The advantage is that because less foam is needed to fill a tray, less fluoride is likely to be ingested by small children, reducing the risk of toxicity. Air-drying the teeth prior to administering the one-minute APF foam application was reported by Hattab to significantly increase fluoride uptake by the enamel. Stookey et al found that fluoride uptake was greater when patients did not rinse for 30 minutes after fluoride application.

APF and stannous fluoride are the only professionally applied topical fluorides that, when applied semi-annually, have been clinically demonstrated to be effective in caries inhibition.

Recommended Fluoride Gel Content in Foam Trays when Using 1.23 Percent APF Gel

Tray Size	Amount of Fluoride Gel contained in a 1/3 full tray
Child 10 kg/22 lb. = 4 ml	Child 20 kg/44 lb. = 8 ml
Large	5.0 ml (1 tsp.)
Medium	3.3 ml (0.6 tsp.)
Small	2.5 ml (0.5 tsp.)

Stannous Fluoride (SnF)

Stannous fluoride (8 percent) has many disadvantages, including:

- an unpleasant taste
- staining of demineralized enamel lesions and of margins of composite restorations
- tissue irritation and gingival sloughing
- storage instability, which requires daily fresh preparation

As with APF, four-minute, semi-annual applications are recommended.

Several SnF/APF products for in-office application are now available in a dual-rinse form. These preparations contain a reduced concentration of APF (0.13 percent) and SnF (1.64 percent). The dental professional should be advised that these combination products have not been approved by the ADA's

Council on Dental Therapeutics and therefore cannot be discussed relevant to caries reduction in inhibition.

Varnishes

Fluoride varnishes containing 226,000 ppm of fluoride have been available in Canada and Europe for more than 20 year as a caries preventing agent. In the United States, fluoride varnishes have been approved by the FDA only as medical devices to be used as cavity liners and for desensitizing teeth—not as a caries-preventive agent. Benefits of fluoride varnish include:

- ease of application
- less chance of accidental swallowing than gels (when administered to young children)
- reduced chair time
- eliminated need for polishing with a rubber cup because varnish penetrates dental plaque

These properties make fluoride varnish ideal for young children enrolled in public health programs or school systems that provide dental care.

Comparison of Fluoride Varnishes Available in the U.S.

Product Name	Manufacturer	How Supplied	Concentration	Milligrams of Fluoride in a Typical Varnish Application
Duraphat	Colgate Oral Pharamceuticals	10 mL tube	5% fluoride or NaF/2.26 %	6.8-11.3
Duraflor	Pharma-science Inc.	10 mL tube	5% fluoride or NaF/2.26 %	6.8-11.3
Fluor Protector	Ivoclar-Vivadent	Single dose of 0.4 mL and ampules of 1 mL	1% di-fluorsilane/0.1% fluoride	0.3-0.5

Application of fluoride varnishes requires a brush, a cotton-tip applicator or a syringe-type applicator (included with the product) to apply approximately 0.3 to 0.5 milliliters directly onto the teeth. It should be noted that fluoride varnishes are not intended to adhere permanently to the tooth surface, rather to remain in close contact with the enamel for several hours.

In many instances toothbrushing only may be sufficient to clean the patient's teeth before application; prophylaxis is not required. Dental floss may be used to ensure that the varnish reaches interproximal areas. Application generally takes four minutes, depending upon the number of teeth indicated for treatment.

Thorough drying prior to application is not generally required because the varnish sets when it comes into contact with saliva. Usually wiping the teeth with gauze or cotton rolls is sufficient.

The patient should be instructed to avoid eating for two to four hours after the varnish application and to avoid brushing the teeth the night of the application to maximize interproximal contact. Fluoride varnish remains on the tooth surfaces for several hours. Microscopic evaluation of the enamel surface has demonstrated that small blocks of varnish remain attached to enamel even after in vitro demineralization challenge and sonication. The only known disadvantage of fluoride varnish is temporary tooth discoloration.

In a review of clinical use, cariostatic mechanism, efficacy, safety and toxicity of fluoride varnishes, by Beltran-Aguilar et al, the authors reviewed and summarized in vitro, in vivo and in situ fluoride varnish studies; clinical trials; demonstration programs; position papers; and biomedical literature. They found that extensive laboratory research and clinical trials conducted in Europe and elsewhere indicate fluoride varnishes are equally as efficacious as other caries-preventive agents.

Other studies have demonstrated a 30 to 40 percent reduction in caries of the permanent dentition, as well as up to a 44 percent caries reduction in primary teeth when fluoride varnish is applied.

Although fluoride penetration by varnish is not clearly understood, current research suggests that varnish increases the resistance of enamel to

acid demineralization. The amount of fluoride varnish typically applied is about 0.3 to 0.5 milliliters, delivering about three to six milligrams of fluoride.

Other fluoride-containing dental materials already available on the market include:

- pit and fissure sealants
- glass ionomer cements
- dental floss
- cavity varnishes
- zinc phosphate cements
- orthodontic bracket adhesives
- resin and composite materials and
- amalgam

These offer the benefits of elevated fluoride levels in the dentin, enamel, plaque and saliva. Some questions have been raised regarding the release of fluoride from dental restorative materials, however, especially those that do not dissolve.

TREATMENT OF ACUTE FLUORIDE TOXICITY

While relatively rare, fluoride toxicity may occur in some patients. The following guidelines should be followed in the event of acute fluoride toxicity in the office.

First-Aid Measures:

Prevent absorption from the stomach by administering syrup of ipecac as follows:

PATIENT'S AGE	SYRUP OF IPECAC DOSAGE
12 months to 2 years	15 ml
2 to 5 years	20 ml
5 years and older	30-40 ml

Keep the patient walking to help emetic effects of ipecac.

Milk or calcium solutions such as lime juice may also be used if ipecac is not available.

Medical Management:

- Symptomatic patients should be observed for respiratory or cardiovascular distress.
- Unconscious or convulsive patients will require gastric lavage with endotracheal intubation.
- Activated charcoal administered after emesis will help prevent intestinal absorption.
- Catharsis may be necessary if treatment is delayed.
- Respiratory depression or failure may result.

- Hyperkalemia (treatment with IV infusions of glucose, insulin or sodium polystyrene) or hypocalcemia (treatment with slow IV infusions of calcium chloride) may result.
- Fluoride is a kialysable poison; hemodialysis may be required when the patient is in a coma and does not respond to other medical management measures.

CAUTIONS REGARDING HOME-CARE FLUORIDE PRODUCTS

Although fluoride-containing products have been a staple of caries prevention for many decades, dental healthcare professionals should use caution when prescribing or recommending them to patients for home-care follow-up. Caution should be used because not all products touting attractive marketing claims have been substantiated by clinical data. Choosing fluoride products for patients' home use should be based upon scientific evidence.

Throughout the United States, the daily use of fluoride toothpastes, rinses and gels has increased dramatically in the past decades. These home-care products may be indicated for caries-prone patients, however, dental professionals must recognize the potential risk of dental fluorosis or fluoride toxicity when prescribing or recommending these products.

Another concern is that many of these fluoride home-use products do not have child-proof lids or are not supplied with warning labels displaying potential hazards to the end user. Thus, it is very important that all members

of the dental team educate patients and parents regarding the proper use of all fluoride products employed at home and also of the importance of parental supervision of children 6 and under who use these products.

And finally, before making specific recommendations for supplemental systemic fluoride, the dental practitioner should be aware of the actual level of fluoride in the area's drinking water. This can be obtained by contacting the local public water supplier.

Note: Fluoride supplementation is *not* recommended in locations in which the fluoride level in the public water supply exceeds 0.6 ppm.

HOME-CARE FLUORIDES

The following are various types of home-care fluoride supplements or applications in the form of toothpastes, gels or rinses the dentist may recommend or dispense through prescription to patients.

Fluoride Toothpastes

Routine use of fluoridated dentifrices is indicated for patients of all ages because it increases levels of fluoride in plaque and saliva. Fluoride dispensed in toothpaste as sodium fluoride, sodium monofluoride phosphate, stannous fluoride or amine fluorides is regulated by national regulatory authorities. A concentration of available fluoride ion in toothpastes between 1000 and 1450

parts per million has been clinically shown to provide a safe and effective fluoride concentration.

The fluoride concentration in dentifrices is 0.1 percent or 1,000 ppm. Studies on toothpastes containing NaF and sodium monofluorophosphate have shown a decrease in caries incidence from 15 to 30 percent. In two different clinical studies of dentifrices containing fluoride, NaF was shown to be significantly superior to sodium monoflurophosphate in its caries-inhibiting effect.

Between 95 and 98 percent of all toothpastes commercially supplied provide some form of fluoride, however, not all fluorides are bioavailable. Only toothpastes displaying the ADA Seal of Acceptance should be recommended because of the guarantee of bioavailability of fluorides. Fluoridated toothpastes are most effective when used with a soft-bristle toothbrush, after breakfast and at bedtime to place fluoride in the oral cavity prior at times of expected low salivary activity; this prolongs fluoride availability.

The amount of fluoride introduced into the oral cavity with each brushing can range from 0.1 to 2.0 mg; the amount of fluoride swallowed varies from 10 percent to 100 percent. The amount swallowed often depends upon the age of the child.

Thus, the dental healthcare professional should be concerned about the levels of fluoride ingested by children when brushing with a fluoridated dentifrice, as well as consumption of fluoridated water or the use of fluoride supplements during the patient's dental formative years. Only a "pea-sized"

amount of toothpaste or a “smear layer” of toothpaste should be applied to the toothbrush; patients should be instructed to expectorate after brushing, thus avoiding swallowing of excess toothpaste or fluoride.

When recommending any form of supplemental fluoride, the dental professional should also be aware of individual patient’s requirement for any form of supplemental fluoride, as well as ingredients contained in these products. Some contain sucrose, which can actually contribute to caries. Others contain no dye; one is sweetened with Xylitol®, which has been proved to have a noncariogenic effect upon enamel.

Chewable Fluoride Tablets

Chewable fluoride tablets supply fluoride both topically and systemically. The optimal time recommended to take any fluoride supplement is one hour prior to bedtime because fluoride absorption will not be interrupted by food intake.

Self-applied Fluoride Rinses and Gels

Over-the-counter fluoride products for home use contain 0.05 percent neutral sodium fluoride or 0.4 percent stannous fluoride and are indicated for daily use by the patient. They are especially beneficial to young children because newly erupted teeth absorb more fluoride, both in and just below their surfaces. Prescription fluoride mouth rinses contain 0.2 percent NaF and are indicated for weekly use.

Home-applied fluoride gels and rinses are indicated for adolescents and adults at moderate to high risk for caries, for example:

- patients undergoing orthodontic treatment
- adults with exposed root surfaces
- cancer patients undergoing head and neck radiation
- patients who may be predisposed to xerostomia associated with certain medication use

Caution: Children under age six should *not* use self-applied fluoride rinses or gels because children at these ages are not able to control the swallowing reflex.

FLUORIDE AND THE FUTURE

A proposed intraoral fluoride releasing device, a pea-sized plastic disc, that can be bonded to a posterior tooth, would maintain an intraoral fluoride level appropriate to remineralize incipient carious lesions. The theory is that the device continuously releases a sustained dosage of fluoride over several months and can be easily replaced as necessary.

Patients who could benefit from this device include: xerostomia patients, orthodontic patients, some physically challenged patients and others who experience a high caries incidence.

NATIONAL GUIDELINES FOR FLUORIDE USE

PHS recommendations for fluoride use include an optimally adjusted concentration of fluoride in community drinking water to maximize caries prevention and limit enamel fluorosis. This concentration ranges from 0.7 ppm to 1.2 ppm depending on the average maximum daily air temperature of the area. In 1991, PHS also issued policy and research recommendations for fluoride use. The U.S. Environmental Protection Agency (EPA), which is responsible for the safety and quality of drinking water in the United States, sets a maximum allowable limit for fluoride in community drinking water at 4 ppm and a secondary limit (i.e., nonenforcable guideline) at 2 ppm. The U.S. Food and Drug Administration (FDA) is responsible for approving prescription and over-the-counter fluoride products marketed in the United States and for setting standards for labeling bottled water and over-the-counter fluoride products (e.g., toothpaste and mouthrinse).

Nonfederal agencies also have published guidelines on fluoride use. The American Dental Association (ADA) reviews fluoride products for caries prevention through its voluntary Seal of Acceptance program; accepted products are listed in the ADA Guide to Dental Therapeutics. A dosage schedule for fluoride supplements for infants and children under 16, which is scaled to the fluoride concentration in the community drinking water, has been jointly recommended by the ADA, the American Academy of Pediatric Dentistry (AAPD), and the American Academy of Pediatrics (AAP). (See **Table 1**) In 1997,

the Institute of Medicine published age specific recommendations for total dietary intake of fluoride (See **Appendix 6**). These recommendations list adequate intake to prevent dental caries and tolerable upper intake, defined as a level unlikely to pose risk for adverse effects in almost all persons.

TABLE 1: Recommended Dietary Fluoride Supplement Schedule

Fluoride concentration in community drinking water

Age	<0.3 ppm	0.3–0.6 ppm	>0.6 ppm
0–6 months	None	None	None
6 months–3 years	0.25 mg/day	None	None
3–6 years	0.50 mg/day	0.25 mg/day	None
6–16 years	1.0 mg/day	0.50 mg/day	None

*Sodium fluoride (2.2 mg sodium fluoride contains 1 mg fluoride ion). 0.1 parts per million (ppm)=1 mg/L.

Sources:
Meskin, LH, ed. Caries diagnosis and risk assessment: a review of preventive strategies and management. J Am Dent Assoc 1995;126(suppl):1S-24S.
American Academy of Pediatric Dentistry. Special issue: reference manual 1994–95. Pediatr Dent 1995;16(special issue):1-96.
American Academy of Pediatrics Committee on Nutrition. Fluoride supplementation for children: interim policy recommendations. Pediatrics 1995:95:777.

CONCLUSION

Research has shown that when used appropriately, fluoride is a safe and effective agent for the prevention and control of dental caries. According to the Centers of Disease Control (CDC), fluoride has contributed profoundly to improved dental health. It has been shown that regular use of appropriate dosages of fluoride can protect teeth against tooth decay. The CDC has recommended that to ensure additional gains in oral health, water fluoridation should be extended to additional communities, and fluoride toothpaste should be used widely. Dental clinicians should continue to learn about effective strategies for promoting adherence of fluoride use by parents, caregivers, children, and adults.

Appendix #1

Examination and Comparison of Home Fluoride Gels

Considerations	0.4% Stannous Fluoride (SnF2)	1.1% Neutral Sodium Fluoride (NaF)
Application Frequency	Daily application recommended for best results	Daily application recommended for best results
Application Methods	Brush applied following dentifrice (at bedtime) or applied in a custom tray	Brush applied following dentifrice (at bedtime) or applied in a custom tray
Documented Efficacy	Clinically proven to reduce caries Some research results identify the stannnous ion as having antiplaque properties	Clinically proven to reduce caries
Flavor Analysis	Pleasant Slight metallic taste	Pleasant
Fluoride Strength/ppm	1000 ppm	5000 ppm
pH	2.8 to 5.0	7.0
Potential Adverse Effects	Extrinsic stains Not recommended when esthetic restorations are present Not recommended for children under six	High-potency fluoride gels should be kept out of reach of children Not recommended for children under six
Staining Potential	May produce extrinsic stain	None
Target Patients	Recommended for: Patients wishing to control caries and to reduce plaque Some orthodontic and periodontal patients Patients with dentinal hypersensitivity	Recommended for: Patients with porcelain or composite restorations Patients who cannot tolerate acidic fluorides due to xerostomia, bulimia, soft tissue radiation, chemotherapy or systemic disease Patients with rampant coronal or root caries Orthodontic patients with decalcification Patient using home whitening products

Appendix #2

Examination and Comparison of Professionally Applied Fluorides

Considerations	1.23% Acidulated Phosphate (APF)	2.0% Sodium Fluoride (NaF)
Application Methods	Applicator tray, swab or toothbrush	Applicator tray, swab or toothbrush
Contraindications	Hypersensitivity to fluoride Not for children under 3 years	Hypersensitivity to fluoride Not for children under 3 years
Documented Efficacy	Clinically proven to reduce caries in annual/biannual applications In vivo and in vitro studies have demonstrated remineralization and reduced enamel solubility	Clinically proven to reduce caries Considered most effective using a 4-visit procedure In vivo and in vitro studies have demonstated reductions in remineralization and promotion of remineralization
Flavor Analysis	12300 ppm	9040 ppm
Fluoride Strength/ppm	Rapid - 12000 ppm after 1 minute	Slow - requires a 4-minute application to exceed 1000 ppm
pH	3.0 to 4.0	7.0
Potential Adverse Effects	In vitro studies demonstrate esthetic damage to porcelain, composite resin, glass ionomers, filled sealants and titanium implants	No documented reports
Recommended Application Time	1 to four minutes	4 minutes
Target Patients	Preferred agent for most caries-prone patients	Preferred agent for patients with: Esthetic restorations Reduced salivary flow due to chemotherapy, radiation or medications Inability to tolerate acidic fluorides Root exposure or root caries

Appendix #3

Fluoride Products and Examples

Professionally applied fluorides (5 ml = 1 tsp.)

APF	Butler, Centra, Checkmate, Superdent, Fluridient, Flura Gel, Fel II, Healthco Fl Fel VM, karidium, Kerr Fl Fel, Luride Top Gel, Nupro Top Gel, Predent, Raflour New age, Sultan, Thixo-flur, Topical Fluoride Gel (Pro way Corp)
NaF	Nupro Neutral, Naf Solution (Young)
SnF	SnF_2 Solution (Young)

Patient-applied gels and rinses (120 ml = 1/2 cup)

NaF	(Over-the-counter) Act, Fluorigard, Oral B, Nafrinse
NaF	(Over-the-counter) Fluorinse, Iradican, Nafrinse, Point-Two, Raflour
NaF	(Prescription) Karigel-N, Prevident, Thera-flur, Karigel, Gel II
SnF	(Prescription) Basic Gel, Easy Gel, Flo-Gel, Gel-Kam, Perfect Choice, Quik-Gel, Stop, Geltin, OmniGel

Appendix #4

Commonly Available Fluoride Products by Concentrations, Frequency and Prescription Requirements

Professional Application

Product	Concentration (PPM)	Frequency	Prescription
1.23% APF Solution, Gel, Prophy Paste	12,3000	Twice annually	Yes
.2% NaF Gel	9,050	Twice annually	Yes
0.31% APF-1.64% SnF_2 office rinse	3,300	Twice annually	Yes

Self-applied Mouthrinses/Gels

Product	Concentration (PPM)	Frequency	Prescription
1.1% NaF Gel	5,000	Daily	Yes
0.2% NaF Rinse	905	Weekly	Yes
0.05% NaF Rinse	226	Daily	No
0.63% SnF_2 Rinse	244*	Daily	Yes
0.4% SnF_2 Gel	968	Daily	No
0.05% APF Rinse	200	Daily	No

* Note: The 0.63% SnF_2 rinse is diluted to 0.1% before use. Professionally used topical fluorides may be used more frequently in high-risk patients.

Appendix #4 (con't.)

Commonly Available Fluoride Products by Concentrations, Frequency and Prescription Requirements

Dentrifices

Product	Concentration (PPM)	Frequency	Prescription
0.24% NaF	1,105	1-3 Times Daily	No
0.76 Na_2PO_3F	1,000	1-3 Times Daily	No

Varnishes

Product	Concentration (PPM)	Frequency	Prescription
5% NaF	22,600	2-4 Times Annually	Yes

Charts adapted from: Recommendations for Fluoride Use in Children.

Appendix #5

ADA Council on Scientific Affairs Recommendations on Fluoride Dosage Schedule

Source: ADA Council on Access, Prevention and Interprofessional Relations. Caries Diagnosis and Risk Assessment. A Review of Preventive Strategies and Management. JADA 1995; 126:195.

Age	Fluoride Ion Level in Drinking Water		
	< 0.3 ppm	0.3 – 0.6 ppm	> 0.6 ppm
Birth - 6 mos.	None	None	None
6 mos.- 3 yrs.	0.25 mg/day	None	None
3-6 years	0.50 mg/day	0.25 mg/day	None
6-16 years	1.0 mg/day	0.50 mg/day	None

Appendix #6

Recommended Total Dietary Fluoride Intake

Adapted from Institute of Medicine. Fluoride. In: Dietary reference intakes for calcium, phosphorus, magnesium, vitamin D, and fluoride. Washington, DC: National Academy Press, 1997:288-313.

Age	Reference weight		Adequate intake	Tolerable upper intake
	kg	lb	mg/day	mg/day
Birth - 6 mos.	7	16	0.01	0.7
6-12 mos.	7	20	0.5	0.9
1-3 yrs.	13	29	0.7	1.3
4-8 years	22	48	1.1	2.2
9 years and older	40-76	88-166	2.0-3.8	10.0

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Fluoride Products - Comparisons and Precautions L0054

1. Current research indicates that fluoride is most effective when a high level is maintained in the oral cavity at all times.
A. True
B. False

2. Fluoride is stored in plaque and released in response to the alkaline environment of the oral cavity.
A. True
B. False

3. Neutral sodium fluoride features all of the following benefits EXCEPT:
A. It has an acceptable taste
B. It does not stain teeth
C. It does not affect existing restorations
D. It is recommended as a single-application product
E. It is non-irritating to oral tissues
F. It is a safe alternative to APF for patients with numerous prosthetic Restorations

4. The main disadvantage of APF is its low pH tends to etch porcelain and composite restorative materials.
A. True
B. False

5. Acidulated phosphate fluoride (APF) has been shown to be effective when administered twice annually in
A. 30-second applications.
B. 2-minute applications.
C. 3-minute applications.
D. 4-minute applications.

6. The most commonly used topical fluoride in the dental office because of its storage stability, acceptable taste, tissue compatibility and nonstaining characteristics is:
A. SnF2
B. NaF
C. APF
D. Varnish

7. All of the following are disadvantageous of 8% stannous fluoride EXCEPT:
A. An unpleasant taste
B. Staining of demineralized enamel lesions and of margins of composite restorations
C. Tissue irritation and gingival sloughing
D. Storage instability, which requires daily fresh preparation
E. An unpleasant odor

8. Prior to application of fluoride varnish, prophylaxis must be performed to eliminate enamel pellicle and accumulated plaque.
A. True
B. False

9. The only known disadvantage of fluoride varnish is permanent tooth discoloration
A. True
B. False

10. First-aid measures for treatment of acute fluoride toxicity include all of the following EXCEPT:
A. Administer syrup of ipecac
B. Keep the patient walking to help emetic effects of ipecac
C. Give milk or calcium solutions such as lime juice if ipecac is not available
D. Administer oxygen and start an IV saline solution

11. Fluoride supplementation is not recommended in locations in which the fluoride level in the public water supply exceeds _____ ppm.
A. 0.2
B. 0.4
C. 0.6
D. 0.8

12. In two different clinical studies of dentifrices containing fluoride, NaF was shown to be _____ sodium monoflurophosphate in its caries-inhibiting effect.
A. Significantly superior to
B. Slightly superior to
C. Equally as effective as
D. Less effective than

13. Patients with all of the following may benefit from home-applied fluoride gels and rinses EXCEPT:
A. Adolescents and adults at moderate to high risk for caries
B. Patients undergoing orthodontic treatment
C. Adults with exposed root surfaces
D. Patients with round-house crown and bridge
E. Cancer patients undergoing head and neck radiation
F. Patients who may be predisposed to xerostomia

14. Children under age six should not use self-applied fluoride rinses or gels at home because they are unable to control the swallowing reflex.
A. True
B. False

15. A 25-year-old patient is afflicted with bulimia and anorexia. Which type of home-applied fluoride gel might be recommended for this patient to control plaque and caries formation?
A. 2.0% sodium fluoride (NaF)
B. 1.1% neutral sodium fluoride (NaF)
C. 1.23% acidulated phosphate (APF)
D. Fluoride varnish

16. In vitro studies demonstrate _____ may cause esthetic damage to porcelain, composite resin, glass ionomers, filled sealants and titanium implants.
A. 2.0% sodium fluoride (NaF)
B. 1.1% neutral sodium fluoride (NaF)
C. 1.23% acidulated phosphate (APF)
D. Fluoride varnish

17. For best results on the average patient, 1.23% APF, 0.2% NaF gel or APF 1.64% rinse should be applied professionally:
A. Once monthly
B. Once annually
C. Twice monthly
D. Twice annually

18. Patients using home whitening products may benefit from using homeapplied:
A. 2.0% sodium fluoride (NaF)
B. 1.1% neutral sodium fluoride (NaF)
C. 1.23% acidulated phosphate (APF)
D. Fluoride varnish

19. Air-drying the teeth prior to administering a one-minute APF foam application fluoride _____ uptake by the enamel.
A. Significantly increases
B. Somewhat increases
C. Somewhat decreases
D. Significantly decreases

20. All of the following are advantages or benefits associated with fluoride varnish, EXCEPT:
A. Ease of application
B. Less likelihood of accidental swallowing when used on young children
C. Reduced chair time
D. Eliminated need for polishing with a rubber cup because varnish penetrates dental plaque
E. Approval by the FDA for use as a decay-preventive agent