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Fluoride and Other Preventive Therapies: Maintaining Oral Health at Each Stage of Life

A Peer-Reviewed Publication

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Abstract

Fluoride and other preventive therapies have been used worldwide to combat caries and aid in plaque reduction. Dental professionals should employ current evidence-based research and clinical guidelines when choosing the appropriate method for using medicaments for intraoral disease prevention. When choosing an appropriate regimen, it is important to consider the patient's risk level, dental status, compliance, and preferences.

Educational Objectives

The overall goal of this article is to provide the reader with information on the use of fluorides as part of a caries prevention plan for patients of all ages.

Upon completion of this course, the reader will be able to:

1. List and describe caries risk factors and current recommendations for in-office and home-use topical fluorides corresponding with different risk levels.
2. Review appropriate therapies for young children at risk for caries.
3. List and describe considerations in determining an appropriate caries preventive treatment plan for the adult patient.
4. Identify the various preventive therapies and their applications.

Author Profiles

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Author Disclosures

Matt Crespin, MPH, RDH and Ian Shuman DDS, MAGD, AFAAID have no commercial ties with the sponsors or the providers of the unrestricted educational grant for this course.

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Publication date: Jan. 2017
Expiration date: Dec. 2019

Supplement to PennWell Publications

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Abstract

Fluoride and other preventive therapies have been used worldwide to combat caries and aid in plaque reduction. Dental professionals should employ current evidence-based research and clinical guidelines when choosing the appropriate method for using medicaments for intraoral disease prevention. When choosing an appropriate regimen, it is important to consider the patient's risk level, dental status, compliance, and preferences.

Introduction

The benefits of prescribed and over-the-counter intraoral medicaments to combat disease of both hard and soft tissues are widely known. These medicaments include fluoride, cetylpyridinium chloride (CPC), and xylitol, among others. These treatments may aid in caries prevention and plaque reduction, either individually or in concert with complementary pharmaceuticals. Depending on the indication and the agent, they may be used systemically, as a topical, or both. Fluoride has both a systemic and topical effect on preventing dental caries.

Systemic Fluoride

According to the Centers for Disease Control and Prevention (CDC), "Many communities adjust the fluoride concentration in the water supply to a level known to reduce tooth decay and promote good oral health (often called the optimal level). This practice is known as community water fluoridation, and reaches all people who drink that water. Given the dramatic decline in tooth decay during the past 70 years since community water fluoridation was initiated, the CDC named fluoridation of drinking water to prevent dental caries (tooth decay) as one of "Ten Great Public Health Interventions of the 20th Century."¹

In the United States, the current recommendations² are for local authorities to adjust the local water supply to a level of 0.7 milligrams per liter (0.7 mg/L). In areas where natural fluoride levels are below 0.7 mg/L, fluoride additives are used to bring the level to the optimum level proven to help prevent caries while minimizing the risk of fluorosis. Dental fluorosis is defined as mottling of the teeth caused by excessive intake

of fluorine compounds (Figure 1). Less than 1% of fluorosis seen in the U.S. between ages 6-49 is classified as severe and only 2% is classified as moderate. Nearly two-thirds (60.6%) of Americans are unaffected and have no fluorosis.³

Figure 1. Systemic fluoride can be delivered through drops, tablets, and community public water supplies. Community water fluoridation has proven to have both systemic benefits during tooth development and topical benefits throughout life. Dental providers also must take into consideration the patient's risk level of developing caries, dental status, compliance, and patient preference when using fluoride treatments in office and when making recommendations for home use.



In other areas, where natural levels of fluoride exceed the recommended level, local water plants can remove fluoride. In addition to community water fluoridation, ingestion of fluoride occurs by eating foods processed or grown with fluoridated water, salt fluoridation, and by inadvertent ingestion during ongoing use of fluoride products. Systemic fluoride supplements may be prescribed to high caries-risk children as drops, lozenges, or tablets at varying dosages dependent on the child's age and natural level of fluoride in the drinking water. It is important, for younger patients, that the drinking water be tested if the primary source is well water, which may have higher or lower than recommended amounts of naturally occurring fluoride. This also may occur in areas where local drinking sources are not fluoridated at the optimum level. The American Dental Association currently recommends beginning fluoride supplements at six months if required.⁴ (Table 1)

Table 1. Fluoride Supplement Dosage Schedule—2010⁴

Age	Fluoride Ion Level in Drinking Water (ppm)*		
	<0.3	0.3-0.6	>0.6
Birth–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

*1.0 part per million (ppm) = 1 milligram per liter (mg/l)

** 2.2 mg sodium fluoride contains 1 mg fluoride ion.

More than 3,000 peer-reviewed studies support the safety and efficacy of community water fluoridation.⁴ In recent years, community water fluoridation and even topical fluorides have been under increased scrutiny with the advent of the Internet and the ease in finding inaccurate information. The American Dental Association's 'Fluoridation Facts' is a document that primarily focuses on community water fluoridation. It is an excellent resource for aiding clinicians in guiding their patients regarding the benefits and myths of fluoride.

Topical Fluoride: In-Office Use

Topical fluoride applications continue to evolve, and it is important that dental providers utilize the most current evidence-based guidelines when choosing the most appropriate method of application. Topical fluoride is available as clinical products (e.g., varnishes, gels, rinses, and foams) and home-use fluorides (e.g., toothpastes, other brush-on products, and rinses). Topical fluoride's mechanisms of action help prevent demineralization of tooth structure while promoting remineralization. Topical fluorides available in the U.S. include:

- Sodium fluoride (NaF)
- Sodium monofluorophosphate (MFP)
- Acidulated phosphate fluoride (APF)
- Stannous fluoride (SnF₂)
- Silver diamine fluoride (SDF)
- Other fluoride-releasing dental materials

In-office fluoride treatments such as varnishes, gels, foams, and rinses contain high concentrations of fluoride ranging from 3,000 ppm fluoride to more than 22,000 ppm fluoride. Selecting the appropriate use and frequency of in-office fluoride treatments should be based on age and risk, with ADA recommendations taken into consideration.

Sodium fluoride varnish: Cleared by the Food and Drug Administration (FDA), 5% sodium fluoride varnish is indicated for treating dentin hypersensitivity; however, the primary use worldwide is as an in-office topical fluoride treatment for the prevention of dental caries.^{4,5,6} Sodium fluoride varnish can also be used to treat white-spot lesions that can form along the gingival margin or around orthodontic brackets and has been proven to assist in the remineralization of enamel.⁶ (Figure 2)

Figure 2. White-spot lesions around orthodontic brackets.



Gels and foams are available as either one-minute or four-minute applications. Current evidence supports the use of a four-minute gel; however, its uses are age dependent.⁴ While one-minute gels and foams lower the risk of ingestion, they also result in less contact time of applied fluoride compared to a four-minute application, and recommendations do not support their use.⁶ The ADA has developed clinical recommendations for in-office fluoride use and has published a chairside guide that providers will find useful. (Table 2)

Silver diamine fluoride has been cleared by the FDA as a fluoride application for the treatment of tooth hypersensitivity. Silver has been used in health care for its antimicrobial effect for more than 100 years. Silver diamine fluoride is effective for caries arrestment.⁷ It is now being used to treat lesions in pediatric patients, patients with special health-care needs, and adults.⁷ Silver diamine fluoride can be applied as an ongoing treatment, potentially eliminating the need to have a restoration placed. A side effect of silver diamine fluoride application is that the lesion, when treated, turns black and is cosmetically unappealing.

Prescription Fluoride: At-home Use

At-home fluoride includes toothpaste/dentifrice, gels, and rinses available as over-the-counter (OTC) and prescription products. When recommending the use of at-home fluorides, a variety of factors must be taken into consideration. These include the patient's risk level, compliance, age, and oral health status. Prescription dentifrices and gels containing up to 5,000 ppm fluoride are typically used at home one or two times daily. Patients with recession, exposed roots, fixed orthodontics, and xerostomia among other conditions may benefit from the use of these products. Patients should avoid rinsing, eating, or drinking for 30 minutes following their application. This allows for fluoride absorption into the tooth surface for maximum benefit. Removal of the fluoride via rinsing, eating, or drinking immediately after application diminishes the optimal desired effect.

Prescription rinses containing approximately 900 ppm sodium fluoride can be used in children ages 6 and older. This product is often used in school-based fluoride rinse programs. Children rinse once weekly at school under the supervision of a school nurse or dental hygienist.⁸ The cost and supervision required to provide this type of intervention can be extensive.

Over-the-Counter Fluoride: At-home Use

Dentifrices, and OTC sodium fluoride rinses containing levels of approximately 0.02% or 0.05% fluoride, are available. OTC dentifrices have been studied extensively and their use is recommended for children at the eruption of the first tooth and throughout life for caries prevention. Rinses containing acidulated phosphate fluoride and stannous fluoride have also proven to reduce caries.^{9,10} Heifetz et al. conducted a long-term comparison on the anticaries effectiveness of daily and weekly rinsing with sodium fluoride solutions over a three-year period.¹¹ It was concluded that rinsing with a

Table 2. ADA Clinical Recommendations For In-Office Fluoride

Clinical Recommendations for Use of Professionally-Applied or Prescription-Strength, Home-Use Topical Fluoride Agents for Caries Prevention in Patients at Elevated Risk of Developing Caries

Strength of recommendations: Each recommendation is based on the best available evidence. The level of evidence available to support each recommendation may differ.

 Strong	 In favor	 Weak	 Expert Opinion For	 Expert Opinion Against	 Against
Evidence strongly supports providing this intervention	Evidence favors providing this intervention	Evidence suggests implementing this intervention only after alternatives have been considered	Evidence is lacking; the level of certainty is low. Expert opinion guides this recommendation	Evidence is lacking; the level of certainty is low. Expert opinion suggests not implementing this intervention	Evidence suggests not implementing this intervention or discontinuing ineffective procedures

Age Group or Dentition Affected	Professionally-Applied Topical Fluoride Agent	Prescription-Strength, Home-Use Topical Fluoride Agent
Younger than 6 years	2.26% fluoride varnish at least every 3 to 6 months ● In Favor	
6-18 years	2.26% fluoride varnish at least every 3 to 6 months ● In Favor OR 1.23% fluoride (APF*) gel for 4 minutes at least every 3 to 6 months ● In Favor	0.09% fluoride mouthrinse at least weekly ● In Favor OR 0.5% fluoride gel or paste twice daily ● Expert Opinion For
Older than 18 Years	2.26% fluoride varnish at least every 3 to 6 months ● Expert Opinion For OR 1.23% fluoride (APF*) gel for 4 minutes at least every 3 to 6 months ● Expert Opinion For	0.09% fluoride mouthrinse at least weekly ● Expert Opinion For OR 0.5% fluoride gel or paste twice daily ● Expert Opinion For
Adult Root Caries	2.26% fluoride varnish at least every 3 to 6 months ● Expert Opinion For OR 1.23% fluoride (APF*) gel for 4 minutes at least every 3 to 6 months ● Expert Opinion For	0.09% fluoride mouthrinse daily ● Expert Opinion For OR 0.5% fluoride gel or paste twice daily ● Expert Opinion For

sodium fluoride solution was effective at reducing overall caries in children ages 10-12 by up to 40%.¹¹ A short-term double-blind clinical trial using oral rinses containing 0.05% neutral sodium fluoride was conducted by Duarte et al. and included a total of 170 children, ages 11 to 15 years, with active smooth-surface caries lesions.¹² The study evaluated the effectiveness in arresting active enamel caries lesions after 28 days and found that 0.05% neutral sodium fluoride was effective in yielding up to an 84% caries arrestment for early smooth-surface caries with daily rinsing.

Children Ages 0-3

One of the first decisions parents may make is the choice to breastfeed and/or use formula. The American Academy of Pediatrics recommends breastfeeding for the first six months of life. However, if an infant is exclusively consuming formula reconstituted with fluoridated water, the child may be at increased risk for developing mild fluorosis depending on the type of formula.⁴ When children start drinking water, they can immediately begin with fluoridated water at 0.7 ppm fluoride. Studies support that fluoride consumed

is partly excreted in saliva and thus protects against dental caries, since it inhibits demineralization.⁴

Upon eruption of the first tooth, parents/caregivers should begin brushing the child’s teeth with a fluoridated OTC dentifrice two times daily using a smear the size of a grain of rice. For those at risk for developing early childhood caries, the application of 5% sodium fluoride varnish two times annually is recommended by the ADA.⁴

Children Ages 3-5

While recommendations stress that a dental home should be established for a child by age 1, it is often not until ages 3 or even 5 that many children have their first dental visit. Beginning at age 3, parents should be advised that a pea-sized amount of OTC fluoridated toothpaste be used to brush twice daily. Silver diamine fluoride can be used for children who develop caries in this age range as a noninvasive method of arresting caries. In addition, this is far less traumatic for the child than undergoing restorative care and easier to manage for the dental provider. A dental hygienist can apply SDF, making it a more cost-effective method of

managing this type of patient. Ongoing use of 5% sodium fluoride varnish applied two times annually should continue for children found to be at risk for developing early childhood caries.^{4,12}

Children Ages 6-12

Treatment protocols for children this age are similar to those discussed previously. The introduction of an OTC fluoride rinse can be added to at-home treatment recommendations based on risk. The application of dental sealants, which may or may not be fluoride releasing, can be used on first and second permanent molars and bicuspid. An OTC fluoridated toothpaste and rinse should be used as directed. The application of 5% sodium fluoride varnish or 4-minute APF gel should be based on risk level.

Teenagers

Adolescent children between the ages of 13 and 20 present a variety of challenges in managing caries. It is not uncommon for teenagers to present with orthodontic appliances. Bands and brackets are excellent hosts for food and plaque, which assist in the demineralization process. The use of prescription fluoridated gels/pastes at home and/or OTC fluoride rinses may aid in caries prevention for this age group.^{9,13} It is often at this age that patients will consume increased amounts of sugar-sweetened beverages; therefore, it is important to evaluate a patient's diet. Application of 5% sodium fluoride varnish or 4-minute 1.23% APF gel is the recommended method of in-office fluoride delivery at this age.⁴ The continued use of OTC fluoridated toothpaste and rinses is recommended.

Adults and Seniors

Adults may present with a variety of conditions that may benefit from different fluoride modalities to prevent caries. The use of OTC fluoridated toothpaste for brushing twice daily is recommended. Risk for dental caries and conditions such as acid erosion allow for the recommendation of fluoride rinses or prescription-strength fluoride gels for use at home. Patients may benefit from prescription or OTC home-use fluoride rinses.⁴ Root exposure is a common occurrence in adults and, even when minor, can also result in significant sensitivity to thermal change and sweets. Adults with caries risk factors may benefit from 5% sodium fluoride varnish application,^{4,10} or 1.23% APF gel applied in-office for four minutes in a carrier tray.

Cetylpyridinium Chloride (CPC)

Cetylpyridinium chloride (CPC), a cationic quaternary ammonium compound, is an antiseptic that has microbicidal effects. It is available in a variety of mouth rinses, and has been shown to be effective as a rinse.^{14,15} Figure 3. Dental plaque contains cariogenic bacteria and harbors the bacteria whose acidic by-products decalcify mineralized tooth structure, leading to dental caries.

Figure 3. Gingivitis



Cetylpyridinium Chloride (CPC): Plaque Reduction and Antimicrobial Properties

A study conducted by Versteeg et al. evaluated the plaque inhibitory effect of a CPC mouthrinse.¹⁶ Using a crossover procedure, a total of 30 adult subjects were randomly assigned to use one of three different mouth rinses three times a day for three days. "Over three sessions, the mean plaque scores were 2.17 for the control product, 1.14 for the CPC group and 1.12 for the 0.1% hexetidine product (positive control). Results of the questionnaire show that, compared with hexetidine, the taste of the CPC was appreciated better, and less oral sensations were observed following rinsing. The CPC mouth rinse proved to be effective in inhibiting 'de novo' plaque formation to an extent similar to that of a 0.1% hexetidine product."¹⁶

In a separate study, He et al. conducted a randomized double-blind clinical study regarding the antimicrobial efficacy of different mouthwashes, (with and without CPC, in an alcohol base, and in an alcohol-free base).¹⁷ "Rinsing with the CPC-containing mouthwash realized a statistically significant reduction in numbers of supragingival anaerobic bacteria at the 12-hour evaluation after a single use. It was found that the CPC mouthwash in an alcohol-free base (ACT Advanced Care Plaque Guard Mouthwash) reduced supragingival plaque bacteria by 34.5% and 70.9% compared to the control mouthwash 12 hours after a single use and after 14 days of use, respectively. In addition, the CPC mouthwash in an alcohol base (ACT Advanced Care Plaque Guard Mouthwash) reduced supragingival bacteria by 35.3% and 73.8% compared to the control mouthwash 12 hours after a single use and after 14 days of use, respectively. There were no statistically significant differences between the CPC-containing mouthwashes at either of the post-treatment time points."¹⁷

Based on research, it would appear that bacteria are not the only microorganisms affected by CPC. A study by Pitten and Kramer determined the efficacy of cetylpyridinium chloride when used as an oropharyngeal fungicidal antiseptic.¹⁸

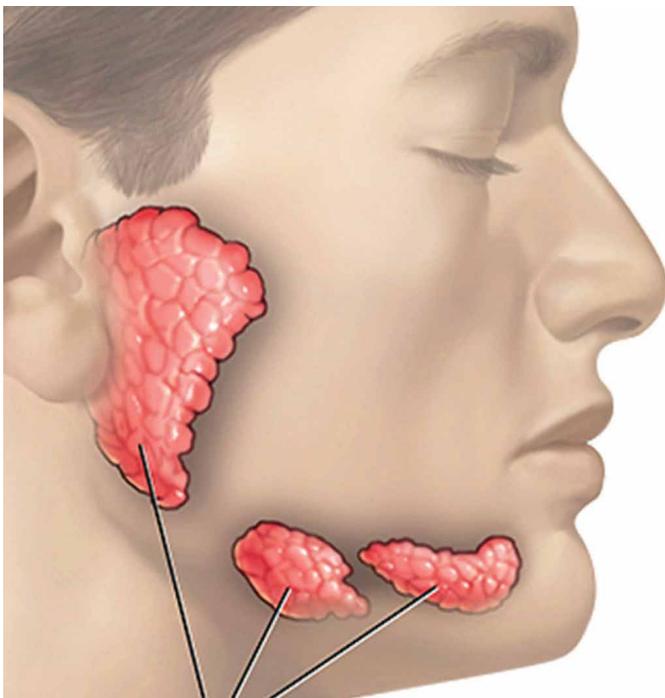
Use of a CPC mouth rinse can significantly reduce infectious aerosols in dental practice, thereby protecting both

staff and the patient. In addition, long-term use of CPC does not disturb the balance of intraoral bacterial flora and it may be considered as an alternative active ingredient in the case of chlorhexidine intolerance.¹⁸

Xylitol

Xylitol, a plant product, is a carbohydrate and natural sweetener. Unlike fermentable carbohydrates, harmful intraoral bacteria cannot metabolize xylitol. However, xylitol's effect on dry mouth has held the interest of some researchers and clinicians. Dry mouth, or xerostomia, involves reduced production of saliva and salivary changes that affect the quantity and quality of saliva. Dry mouth is associated with an increased risk for caries and erosion, and with dysphagia. (Figure 4) It has been suggested that xerostomia affects up to 64.8% of the U.S. population.¹⁹

Figure 4.



Some of the causes of dry mouth include but are not limited to head and neck radiation, chemotherapies, medications, tobacco use, and Sjögren's syndrome. "Xerostomia can be managed with saliva substitutes, but a number of potential systemic therapies of long-standing xerostomia now exist."²⁰ In a study by ElSalhy et al., the bacteriostatic effect of xylitol mouth rinse was evaluated against salivary *Streptococcus mutans* counts.²¹ Significant reductions in the scores of *S. mutans* were found following a four-week period of 20% xylitol mouth rinse. Xerostomia treatment depends on the cause and is commonly due to age, disease, and medication. The following steps should be followed, while attempting to pinpoint the cause.²²

Table 3. The Mayo Clinic recommends the following:

•	Use xylitol-containing sugar-free gum/hard candies to stimulate the flow of saliva.
•	Limit caffeine intake.
•	Avoid alcohol-containing mouthwashes.
•	Stop all tobacco use.
•	Sip water regularly.
•	Use over-the-counter saliva substitutes containing xylitol, carboxymethylcellulose, or hydroxyethyl cellulose.
•	Use mouthwash designed for dry mouth — especially one that contains xylitol (Biotene Dry Mouth Oral Rinse, for example) or which offers the added benefit of protection against dental caries (ACT Total Care Dry Mouth Rinse, for example).
•	Avoid using over-the-counter antihistamines and decongestants.
•	Breathe through the nose and moisturize nighttime air with a room humidifier.
•	Avoid sugary foods and candies because they increase the risk of dental caries.
•	Brush with a fluoride toothpaste. Ask your dentist if you might benefit from prescription fluoride toothpaste.
•	Use a fluoride rinse or brush-on fluoride gel before bedtime.

Conclusion

Evidence-based research and clinical guidelines should be consulted when selecting an appropriate method for using medicaments in the prevention of common intraoral diseases. Assessing patients' risk and current oral health status is critical in determining the most appropriate and effective intervention to use. Clinical decision-making and patient preference and compliance should be taken into consideration when determining treatment modalities.

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Author Disclosure

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Questions

- Which of the following preventive therapies have been used worldwide as agents used to combat caries and aid in plaque reduction?
 - Fluoride
 - Homocysteine
 - Acetylchlorine
 - None of the above
- Community water fluoridation benefits children:
 - Systemically
 - Topically
 - A and B
 - None of the above
- Community water fluoridation benefits adults:
 - Systemically
 - Topically
 - Both a and b
 - None of the above
- In the U.S., the current recommendations are for local authorities to adjust the local water supply to a level of:
 - 0.8 ppm
 - 0.7 milligrams per liter
 - 0.5 milligrams per liter
 - 2.0 ppm
- Fluoride supplementation can be delivered using:
 - Drops
 - Lozenges
 - Tablets
 - All of the above
- When should fluoridated toothpaste be introduced to children?
 - At the eruption of the first tooth
 - 1 years old
 - 2 years old
 - 5 years old
- In the U.S., severe fluorosis is seen less than:
 - 0.01% of the time
 - 0.1% of the time
 - 10% of the time
 - 1% of the time
- Sodium fluoride varnish has strong evidence to support its use for treating:
 - Dentin hypersensitivity
 - Gingival recession
 - Internal resorption
 - All of the above
- Gels and foams are available as applications for either:
 - 2 minutes
 - 3 minutes
 - 1 or 4 minutes
 - None of the above
- Silver diamine fluoride has been cleared by the FDA as a fluoride application for the treatment of:
 - Dens In dente
 - Ankylosis
 - Tooth hypersensitivity
 - A and B
- What is the concentration of fluoride of most OTC toothpastes available on the market?
 - 0.02%
 - 0.05%
 - 0.2%
 - A and B
- How much fluoridated toothpaste should be used when brushing the teeth of a 3-year-old?
 - None, should use training toothpaste
 - Smear the size of a grain of rice
 - Pea-sized amount
 - Long-line the length of the brush
- Upon eruption of the first tooth, parents/caregivers should begin brushing the child's teeth twice daily with what amount of fluoridated OTC dentifrice?
 - None, should use training toothpaste
 - Smear the size of a grain of rice
 - Pea-sized amount
 - Long-line the length of the brush
- School-based fluoride rinse programs have been proven to reduce caries by:
 - 28%
 - 47%
 - 54%
 - 57%
- Which of the following preventives were discussed in this course?
 - Fluoride, cetylpyridinium chloride (CPC), and xylitol
 - Fluoride, cetylpyridinium chloride (CPC), and xylitol
 - Fluoride, cetyl-dilithium chloride (CPC), and xylitol
 - None of the above
- Which of the following agencies named fluoridation of drinking water to prevent dental caries as one of Ten Great Public Health Interventions of the 20th Century?
 - ADA
 - AARP
 - CPC
 - CDC
- In the U.S., less than 1% of fluorosis cases are classified as:
 - Extremely mild
 - Moderate
 - Severe
 - Mild
- At what age should children visit the dentist for the first time?
 - 1
 - 3
 - 4
 - 5
- Cetylpyridinium chloride is a:
 - Cationic quaternary ammonium compound
 - Anionic quaternary ammonium compound
 - Cationic tertiary ammonium compound
 - Anionic tertiary ammonium compound
- Providers treating children who live in a community without fluoridated water can recommend:
 - No intervention is necessary
 - Fluoride supplementation using drops, tablets, or lozenges
 - Drinking bottled water without fluoride
 - Brushing with nonfluoridated toothpaste
- Topical fluorides available in the U.S. include:
 - Sodium fluoride (NaF)
 - Sodium monofluorophosphate (MFP)
 - Acidulated phosphate fluoride (APF)
 - All of the above
- Adults benefit from:
 - Drinking fluoridated water
 - Brushing with fluoridated toothpaste
 - Using a fluoridated rinse twice daily
 - All of the above
- Rinses containing which of the following have proven to reduce caries?
 - Hydrofluoric acid
 - Stannous fluoride
 - Acidulated phosphate fluoride
 - B and C
- Fluoride varnish has shown to be effective in the following age groups:
 - Teenagers
 - 3-6
 - Seniors
 - All of the above
- Most prescription fluoride gels for at-home use contain what concentration of fluoride?
 - 1,000 ppm
 - 3,500 ppm
 - 5,000 ppm
 - 8,000 ppm
- Fluoride varnish is approved by the FDA for the following:
 - Treating Hypersensitivity
 - Arresting caries
 - None of the above
 - A and B
- In-office fluoride treatments such as varnishes, gels, foams, and rinses can contain high concentrations of fluoride ranging from:
 - 2,000 ppm to more than 32,000 ppm
 - 3,000 ppm to more than 22,000 ppm
 - 3,000 ppm to more than 32,000 ppm
 - 2,000 ppm to more than 22,000 ppm
- Long-term use of which of the following can significantly reduce infectious aerosols in dental practice, thereby protecting both staff and the patient?
 - CPC mouth rinse
 - Prescription fluoride rinses
 - OTC fluoridated toothpaste
 - Silver diamine fluoride
- Sealants, with and without fluoride release, have been proven to be effective on:
 - First permanent molars
 - Second permanent molars
 - Bicuspid
 - All of the above
- Children living in nonfluoridated communities can benefit from which of the following to reduce caries?
 - Brushing twice daily with fluoridated toothpaste
 - Fluoride supplementation
 - Bottled water with fluoride
 - All of the above

Fluoride and Other Preventive Therapies: Maintaining Oral Health at Each Stage of Life

Name: _____ Title: _____ Specialty: _____

Address: _____ E-mail: _____

City: _____ State: _____ ZIP: _____ Country: _____

Telephone: Home () _____ Office () _____

Lic. Renewal Date: _____ AGD Member ID: _____

Requirements for successful completion of the course and to obtain dental continuing education credits: 1) Read the entire course. 2) Complete all information above. 3) Complete answer sheets in either pen or pencil. 4) Mark only one answer for each question. 5) A score of 70% on this test will earn you 3 CE credits. 6) Complete the Course Evaluation below. 7) Make check payable to PennWell Corp. **For Questions Call 800-633-1681**

Educational Objectives

- List and describe caries risk factors and current recommendations for in-office and home-use topical fluorides corresponding with different risk levels.
- Review appropriate therapies for young children at risk for caries.
- List and describe considerations in determining an appropriate caries preventive treatment plan for the adult patient.
- Identify the various preventive therapies and their applications.

Course Evaluation

1. Were the individual course objectives met?

Objective #1: Yes No Objective #2: Yes No
Objective #3: Yes No Objective #4: Yes No

Please evaluate this course by responding to the following statements, using a scale of Excellent = 5 to Poor = 0.

- | | | | | | | |
|---|-------|---|-----|-----|----|---|
| 2. To what extent were the course objectives accomplished overall? | 5 | 4 | 3 | 2 | 1 | 0 |
| 3. Please rate your personal mastery of the course objectives. | 5 | 4 | 3 | 2 | 1 | 0 |
| 4. How would you rate the objectives and educational methods? | 5 | 4 | 3 | 2 | 1 | 0 |
| 5. How do you rate the author's grasp of the topic? | 5 | 4 | 3 | 2 | 1 | 0 |
| 6. Please rate the instructor's effectiveness. | 5 | 4 | 3 | 2 | 1 | 0 |
| 7. Was the overall administration of the course effective? | 5 | 4 | 3 | 2 | 1 | 0 |
| 8. Please rate the usefulness and clinical applicability of this course. | 5 | 4 | 3 | 2 | 1 | 0 |
| 9. Please rate the usefulness of the supplemental bibliography. | 5 | 4 | 3 | 2 | 1 | 0 |
| 10. Do you feel that the references were adequate? | | | | Yes | No | |
| 11. Would you participate in a similar program on a different topic? | | | Yes | No | | |
| 12. If any of the continuing education questions were unclear or ambiguous, please list them. | _____ | | | | | |
| 13. Was there any subject matter you found confusing? Please describe. | _____ | | | | | |
| 14. How long did it take you to complete this course? | _____ | | | | | |
| 15. What additional continuing dental education topics would you like to see? | _____ | | | | | |

If not taking online, mail completed answer sheet to
PennWell Corp.
Attn: Dental Division,
1421 S. Sheridan Rd., Tulsa, OK, 74112
or fax to: 918-831-9804

For IMMEDIATE results,
go to www.DentalAcademyofCE.com to take tests online.
INSTANT EXAM CODE 15121
Answer sheets can be faxed with credit card payment to
918-831-9804.

Payment of \$59.00 is enclosed.
(Checks and credit cards are accepted.)

If paying by credit card, please complete the following: MC Visa AmEx Discover

Acct. Number: _____

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Charges on your statement will show up as PennWell

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|---------------------|---------------------|
| 1. (A) (B) (C) (D) | 16. (A) (B) (C) (D) |
| 2. (A) (B) (C) (D) | 17. (A) (B) (C) (D) |
| 3. (A) (B) (C) (D) | 18. (A) (B) (C) (D) |
| 4. (A) (B) (C) (D) | 19. (A) (B) (C) (D) |
| 5. (A) (B) (C) (D) | 20. (A) (B) (C) (D) |
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| 7. (A) (B) (C) (D) | 22. (A) (B) (C) (D) |
| 8. (A) (B) (C) (D) | 23. (A) (B) (C) (D) |
| 9. (A) (B) (C) (D) | 24. (A) (B) (C) (D) |
| 10. (A) (B) (C) (D) | 25. (A) (B) (C) (D) |
| 11. (A) (B) (C) (D) | 26. (A) (B) (C) (D) |
| 12. (A) (B) (C) (D) | 27. (A) (B) (C) (D) |
| 13. (A) (B) (C) (D) | 28. (A) (B) (C) (D) |
| 14. (A) (B) (C) (D) | 29. (A) (B) (C) (D) |
| 15. (A) (B) (C) (D) | 30. (A) (B) (C) (D) |

AGD Code 344

PLEASE PHOTOCOPY ANSWER SHEET FOR ADDITIONAL PARTICIPANTS.

COURSE EVALUATION and PARTICIPANT FEEDBACK
We encourage participant feedback pertaining to all courses. Please be sure to complete the survey included with the course. Please e-mail all questions to: lhodges@pennwell.com.

INSTRUCTIONS
All questions should have only one answer. Grading of this examination is done manually. Participants will receive confirmation of passing by receipt of a verification form. Verification of Participation forms will be mailed within two weeks after taking an examination.

COURSE CREDITS/COST
All participants scoring at least 70% on the examination will receive a verification form verifying 3 CE credits. The formal continuing education program of this sponsor is accepted by the AGD for Fellowship/Mastership credit. Please contact PennWell for current term of acceptance. Participants are urged to contact their state dental boards for continuing education requirements. PennWell is a California Provider. The California Provider number is 4527. The cost for courses ranges from \$20.00 to \$110.00.

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