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Asthma, allergic rhinitis, and tooth decay

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ABSTRACT

Asthma and seasonal allergies are chronic, yet treatable conditions that have been shown to alter the oral microbiome. As oral health providers, we are called to help our patients cultivate the microbiome of their oral cavity to achieve and maintain health. Specifically, this course will define asthma and seasonal allergies, explain the current treatment recommendations, and discuss how these disease processes and treatments affect oral health. This course also identifies ways that oral health professionals can help patients with seasonal allergies and/or asthma achieve oral and overall wellness.

EDUCATIONAL OBJECTIVES

1. Understand the impact of asthma and seasonal allergies locally (for the patient) and nationally
2. Review the current treatment recommendations for asthma and seasonal allergies
3. Compare and contrast how both disease processes and their subsequent treatments can impact oral health
4. Discuss how changing patient behaviors and using innovative products can improve oral health in patients with asthma and allergic rhinitis (AR)



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WHAT IS ASTHMA?

Asthma is a chronic lung condition that results in inflammation in the bronchial tubes that carry air (with oxygen) in and out of the lungs. Patients with asthma often have an inflammatory reaction to their environment, emotions, or physical activities. Triggers can include, but are not limited to, time of day, viral respiratory infections, allergens or irritants (seasonal, e.g., grass; environmental, e.g., dust in apartment; occupational, e.g., fumes), weather changes, laughing, crying, stress, or exercise.¹ The frequency, severity, and source of triggers for asthma attacks are unique to each individual. Understanding asthma is important because patients can be exposed to many of the environmental triggers for an asthma attack during a dental appointment. Environmental triggers can include fumes from a cleaning agent or dental material (e.g., chemicals used to disinfect the office, dental bonding agent, or materials associated with acrylic resin) or aerosols. When aerosols are generated from a procedure, physical particles, chemicals, pathogens, and water are dispersed in the air around the chair and can be inhaled and cause irritation. Providers wear masks, but often patients are exposed to this aerosol, and this cloud of irritants can trigger an asthma attack during a dental appointment. Lastly, stress or a response due to stress (e.g., crying, anxiety) can trigger an asthma attack. Reducing environmental triggers or stress can help prevent asthma attacks during dental appointments.

Surveillance from the 2016–2018 National Health Interview Survey (NHIS) estimates that across the US, 7.7% of the population suffered from asthma in 2018.² This accounts for roughly 5.5 million cases in children and 19 million cases in adults. Patients who are female, low income, or Black are more likely to suffer from asthma.² It is estimated that more than 11 million asthma attacks occur each year among people with asthma, which includes about 45% of all patients with the diagnosed condition.² According to 2014–2017 NHIS data from across the US, the range of asthma attacks varied geographically by state and was as low as 23.1% in Nebraska to as high as 66.6% in Alaska.³

HELPING PATIENTS WITH ASTHMA

Examples of ways to reduce these triggers include ensuring that you clean the room and keep it well ventilated prior to the patient's arrival. Severe asthmatic patients may request the first appointment of the day to reduce the number of fumes, aerosols, or irritants in the room or office. For other patients, you may find it helpful to source alternatives to chemical agents that evaporate or release fumes into the air when possible, ensure that a rubber dam is used to prevent chemical odors in their airway, or keep the appointment shorter to reduce total exposure to triggers.

Additionally, having a discussion with the patient about sources of stress that cause fear or dental anxiety can be helpful. For many patients, knowing what is going on, being aware and working through finances in advance, or knowing they are in control can reduce stress and anxiety. It can be helpful to have a patient walk through his or her most successful medical visit for you out loud. You will be able to clearly articulate alongside the patient what a successful visit will look and feel like for this patient. Simple environmental controls for anxiety relief include weighted blankets, using music or podcasts during the procedure, holding a suction or raising a hand as a signal, or having a care animal in the practice.

ASTHMA TREATMENTS

Successfully treating asthma is not achieved by taking medications alone. Health-care providers do prescribe oral or inhalation medications to treat symptoms, but they also develop a process to remove or reduce exposure to triggers. Patients will likely have a quick-relief inhaled medication such as a short-acting beta2-agonist (SABA) to relieve symptoms, such as shortness of breath, wheezing, coughing, or chest tightness. Long-term asthma control medications include one or a combination of the following: inhaled corticosteroid, oral-systemic corticosteroid, inhaled long-acting beta2-agonist (LABA), leukotriene receptor antagonist, immunomodulators (anti-IgE), mast cell stabilizer (nebulizer treatment), or methylxanthines.

From a pharmacological perspective, SABA and LABA inhalers are associated with adverse outcomes, such as an unpleasant taste, glossitis, sinusitis, and xerostomia.⁴ In one study, no specific dental interactions were reported with leukotriene receptor antagonists, mast cell stabilizers, or methylxanthines. Among immunomodulators used to treat asthma, benralizumab was associated with pharyngitis, and reslizumab was associated with oropharyngeal pain.⁴

ASTHMA AND TOOTH DECAY

Disease processes and medication have an effect on overall health, including oral health. For many years, individual studies evaluating the relationship between asthma and tooth decay were inconclusive. However, in 2010, a systematic review and meta-analysis conducted on asthma and tooth decay in primary dentition clarified the relationship. A review of 14 articles from 1950–2010 demonstrated that children with primary dentition have more than double the odds (OR = 2.73) of having tooth decay if they were diagnosed with asthma.⁵ Additionally, for children and adults with permanent dentition who have asthma, their risk for developing tooth decay is more than doubled (OR = 2.04).⁵

There are a few plausible explanations for this relationship that have been elucidated by research, including the change in saliva due to the disease process and medication. Research has shown that salivary composition changes in patients with asthma, including electrolyte concentration, flow rate, and inflammatory components, meaning that the inflammatory disease process of asthma may alter saliva. A comparative study in 2016 evaluated children who were healthy and children with asthma. This study showed tooth decay increases with inhaler usage, suggesting that the side effect of medications could have more of an impact to caries risk than the disease process alone. Medications used to treat asthma have various side effects, and many inhaled medications have a low pH and/or have a sweetener as a carrier for the inhaled medication. SABA and LABA are known to induce oral health-related adverse effects,

including hyposalivation. Researchers have shown that the interdental plaque pH decreases for 30 minutes after the use of an inhaler, and this low pH is maintained even after rinsing with water.⁶ In addition to a decreased interdental plaque pH, a study evaluated asthmatic and nonasthmatic patients' unstimulated saliva and found that the pH, buffering capacity, and flow rate all decreased among asthmatics.⁷ This study found increased tooth decay, erosion score, and gingival bleeding. Gingival bleeding has been attributed to the pathogenic biofilm and to behavioral habits of asthmatics, such as mouth-breathing.⁸

In 2016, a study of asthmatic and nonasthmatic children showed an increased level of *Streptococcus mutans* and *Lactobacillus* among children with asthma, demonstrating the change in the microbiome that follows the environmental change of the saliva.⁹ In 2019, the full oral microbiomes among children with asthma with and without tooth decay were evaluated. While the composition of the microbiome was not statistically significant, the abundances of several microorganisms varied. Bacterial species that were significantly associated with caries included *Veillonella*, *Haemophilus haemolyticus*, *Kingella oralis*, *Prevotella histicola*, and *Prevotella loescheii*.¹⁰

This study suggests the plaque of children with asthma is "colonized by opportunistic bacteria with a high pathogenic capacity,"¹⁰ meaning that while the community may look similar regarding different species or taxa, the abundance within the groups is different and may explain the pathogenicity of tooth decay in these children.

WHAT IS ALLERGIC RHINITIS?

Seasonal allergies, also known as allergic rhinitis (AR) or hay fever, can be the result of a true allergy (IgE-mediated) or of an infection, or can be autonomic or an idiopathic mechanism. The focus of this course is to discuss seasonal AR due to IgE. Many patients will report seasonal AR based on the temporal pattern, frequency, and severity.¹¹ The temporal pattern can be described as seasonal when symptoms occur during a certain time of the year when an outdoor allergen is high, perennial when symptoms occur year-round, or

episodic when it is due to an occasional environmental exposure. Frequency is based on how often the patient reports symptoms—intermittent or persistent.¹¹ Lastly, the patient will report symptoms based on severity and the impact they have on their quality of life. While IgE-mediated AR is often caused by an outdoor environmental exposure (e.g., pollen), it can also arise from common household or environmental allergens, such as dry skin, urine, saliva, pet dander, mold, or excrement that are present throughout the year.¹² Common symptoms of AR or hay fever include nasal congestion, nasal itching, sneezing, rhinorrhea (runny nose), or conjunctivitis.¹³

AR is estimated to affect one in six US adults, making it one of the most common chronic diseases.¹¹ According to the 2018 NHIS, 7.3% of adults report having hay fever, and it is more common among females and adults ages 45–74.¹⁴ Geographically, hay fever is most common among adults in the Northeastern (9.1%) and Western (8.0%) regions of the United States.¹⁴ Due to the varying severity of symptoms, many cases are left undiagnosed and untreated.¹³

Like asthma, after diagnosis and categorization of the symptoms for AR, patients are encouraged to limit exposure to the allergen. For many patients, complete elimination of exposure to the allergen is not possible, so medications to reduce or eliminate symptoms are needed. The *Clinical Practice Guideline: Allergic Rhinitis* recommends oral second-generation antihistamine and/or either intranasal corticosteroids or antihistamines.¹¹ Oral antihistamines, even second-generation medications, affect the oral cavity by inducing xerostomia. The side effects of specific inhaled corticosteroids vary; however, many are associated with headaches, nasal irritation (e.g., burning or nose bleeds, i.e., epistaxis), pharyngitis, nausea or vomiting, and asthma symptoms (e.g., cough, difficulty breathing). It is interesting that some of the medications used to treat allergies actually induce asthma-like symptoms.

ALLERGIC RHINITIS AND TOOTH DECAY

Over the last few decades, the evidence for the relationship between AR and tooth

decay has been growing, as the disease frequency and treatment change. Historically, cross-sectional research did not show a relationship between AR and tooth decay. However, a recent case-control study found an association between AR and tooth decay in primary and transitional dentition in children. Researchers also found that the severity of AR is linked to an increased number of restorations and decreased caries severity.¹⁵ An explanation for this might be that a patient with severe AR who is at increased risk for caries visits the dentist more frequently and receives restorative care. Additionally, this study showed a relationship between patients with AR who use corticosteroids or antihistamines and tooth decay.

A study was conducted on adults using a national data source in Taiwan, which found an association between AR and dental caries, periodontitis, pulpitis, and gingival and oral ulcers.¹⁶ This study mimicked the results from the study in children in which the use of intranasal corticosteroids was related to increased dental visits for treatment of oral disease, suggesting oral disease severity with the use of these medications.¹⁶

It is important to understand the mechanism or cause for which AR is related to dental caries. Research has suggested an overall decrease in salivary flow rate, an altered microbiome, and various habits, such as mouth-breathing, as contributing factors.¹⁶ A comparative study of adult patients compared the salivary flow rate in four groups consisting of healthy patients, patients with allergies who took no medications, and patients with allergies who took either fexofenadine or loratadine. They found that patients taking fexofenadine (second-generation antihistamine) or presented with allergies alone had higher rates of xerostomia.¹⁷ Among a small group of children, some who had AR (40) and others who were healthy (40), patients with AR had statistically significant higher levels of *S. mutans*.¹⁸

HOW CAN ORAL HEALTH PROVIDERS HELP PATIENTS?

1. Review the asthma action plan

Patients will work with their primary care

providers or specialists to develop an asthma action plan (AAP). AAPs help patients develop new health habits (taking medications regularly and removing triggers), learn to adjust medications when symptoms are more frequent or severe, and know when to seek medical attention. Prior to starting dental treatment, it's helpful to get to know how asthma affects your patient. A few questions that are helpful include:

- Do you have an asthma action plan? If so, would you like to share it?
- When was your last asthma attack?
- When, if ever, were you hospitalized for asthma?
- Have you ever had an asthma attack in a dental office or during a dental appointment?
- If so, do you know the cause of this asthma attack?
- How often do you see the health-care provider who treats your asthma?
- Are you regularly taking your medications? Do you notice any side effects from these medications?
- What do you do immediately after you use your inhaler?

Once you have reviewed the AAP, you can discuss with your patient ways that you can help prevent asthma attacks in the dental office by changing the environment to help address some of the side effects of his or her medications. Always remember that it is important for the patient to have an inhaler with them at all times.

2. Review best practices for inhaler use

Patients with asthma often use inhalers that contain a SABA, LABA, or corticosteroid medication along with fillers. These inhaled medications have been shown to decrease the salivary flow or cause short-term dry mouth and decrease the pH of the oral cavity.¹⁹ In addition, the medication inside inhalers has been shown to have a low pH. This salivary environment, one that is dry and acidic, puts the patient more at risk for tooth decay. In order to combat tooth decay, patients are encouraged to immediately rinse their mouths out with water and spit after using their inhalers and/or spacers. A spacer is a small piece of plastic that creates a space or tube in between the inhaler and the patient's

mouth. Spacers help improve the delivery of the inhaled medication into the airway and help prevent the medication from being inhaled directly onto the tongue. Spacers are particularly helpful with children and new users. A study by Kargul et al. showed that the pH remained low 30 minutes after using an inhaler even when the patient had rinsed. This research study demonstrated that sugar-free chewing gum improved the buffer capacity and returned the pH to normal after inhaler use.⁶ For children or adolescents who have sports-induced asthma, it's important to remind the patient to take out his or her mouthguard, rinse, and then put the mouthguard back in. Rinsing with either xylitol/water or baking soda/water may also help improve and neutralize the pH quickly. Research shows that chewing xylitol gum after inhaler use is beneficial for patients who use inhalers regularly. In a study of 90 children ages 6–12, xylitol gum was shown to improve salivary flow, increase pH, and increase buffer capacity when compared to chewing paraffin wax pellets or nothing.²⁰

3. Address medication-induced or disease-induced xerostomia

For patients who use oral antihistamines— or inhaled corticosteroids, antihistamines, or steroids—medication-induced xerostomia is a challenge and concern. In order to combat this, it can be helpful to measure salivary markers on a regular basis to help titrate products or chemotherapeutics to help the patient achieve oral wellness. There are systems on the market that can measure flow rate, pH, buffer capacity, and various oral bacteria levels, so you can help the patient find an oral health routine that objectively reduces risk for disease. Oral sprays that contain xylitol can help alleviate the symptoms of dry mouth. The benefit to using xylitol sprays is that the patient can carry the small bottle in a purse, pocket, gym bag, or car, or set it on a nightstand. Xylitol sprays can also be helpful to use right after using a nasal spray or inhaler when the mouth might be the driest.

4. Recommend a xylitol nasal spray or rinse

For many patients with AR, finding alternatives to help with symptom relief that

do not have the rebound side effects that corticosteroids and antihistamines have is important. For patients with seasonal AR, the use of intranasal corticosteroids and antihistamines relieves symptoms temporarily. However, many drugs, including corticosteroids (such as fluticasone propionate) have been shown to induce irreversible ciliostasis, or lack of movement of cilia that line the nasal passages and sinus cavities.²¹ Additionally, xylitol has been shown to alter the ability for pathogenic bacteria to adhere to the epithelial lining.²² Postnasal drip is one of the common complaints from patients who have seasonal allergies. Postnasal drip often combines with saliva. When a patient uses xylitol nasal spray or rinse, the postnasal drip will be combined with a xylitol solution that has been shown to have anticaries effects by decreasing pathogenic (and cariogenic) bacteria and increasing the growth of commensal bacteria.

The use of inhalers (e.g., SABA) has been associated with chronic sinusitis as a side effect. Many patients who use corticosteroid inhalers expose their oral and nasal cavities to corticosteroids regularly, and these have the potential to change the normal or commensal flora and allow more pathogenic flora to flourish. Additionally, exposure to corticosteroids—whether orally or intranasal—results in cilia that are paralyzed.²¹ For patients with chronic sinusitis who regularly use an inhaler, rinsing nasal passages after inhaler use with a xylitol and sea salt sinus rinse can help relieve these symptoms and reduce any residual medication in those passages. As always, consult with either the primary care physician or allergist when working with patients to achieve overall wellness.

CONCLUSION

In conclusion, patients with asthma and seasonal allergies can be triggered by various exposures in the dental office. Understanding their diagnosed condition and how triggers can be eliminated or reduced can be the key to successful dental care. Additionally, reviewing patients' medications and their side effects will help you, the oral health-care provider, to address any side effects that have the potential to

contribute to oral disease and to develop an oral wellness plan with your patient for safe use of these medications. The use of xylitol spray and nasal rinse can help reduce some of the known side effects of medications commonly used to treat asthma and seasonal allergies.

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NOTES

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QUESTIONS

1. Which of the following can trigger asthma?

- A. Environmental allergens
- B. Viral respiratory infections
- C. Emotions
- D. All of the above

2. Which of the following is an example of an occupational irritant?

- A. Chemical fumes
- B. Pollen
- C. Cold air
- D. Grass

3. Which of the following aspects of triggers is unique to each individual patient?

- A. Frequency
- B. Severity
- C. Source
- D. All of the above

4. Which of the following is a trigger that a patient is not likely to experience during a dental appointment?

- A. Anxiety
- B. Pollen exposure
- C. Fumes from disinfectant
- D. Aerosol

5. Which of the following is a control that helps the patient reduce anxiety during the visit?

- A. Use of rubber dam
- B. Early appointments
- C. Weighted blankets
- D. None of the above

6. According to the NHIS, what percentage of adults suffer from asthma in the US?

- A. 6.7%
- B. 7.7%
- C. 8.7%
- D. 9.7%

7. Which of the following characteristics is likely associated with an increased risk for asthma?

- A. Female
- B. Male
- C. High income
- D. Caucasian

8. Approximately how many asthma attacks occur each year in the US?

- A. 8 million
- B. 11 million
- C. 15 million
- D. 19 million

9. Which of the following states had the highest rate of asthma attacks?

- A. Alabama
- B. Alaska
- C. Arkansas
- D. None of the above

10. Which of the following is the recommended course of treatment for asthma?

- A. Removing triggers alone
- B. Inhaled and oral medications only
- C. Removing or reducing exposure to triggers alongside short- and long-term medications
- D. No treatment required

11. Which of the following is not a long-term-control asthma medication?

- A. Inhaled short-acting-beta2-agonist (SABA)
- B. Immunomodulators (anti-IgE)
- C. Mast cell stabilizer (nebulizer treatment)
- D. Methylxanthines

12. What are the common side effects of SABA and LABA inhaler use?

- A. Glossitis
- B. Sinusitis
- C. Xerostomia
- D. All of the above

13. Which of the following is a side effect of an immunomodulator such as benralizumab?

- A. Xerostomia
- B. Pharyngitis
- C. Glossitis
- D. Sinusitis

14. In 2010, a systematic review showed that patients with asthma and primary dentition were at increased risk for having tooth decay. For patients with asthma, what was the overall odds ratio for having tooth decay in primary dentition?

- A. 0.73
- B. 1.73
- C. 2.73
- D. 3.73

15. In 2019, researchers reviewed the oral microbiome of patients with asthma who did or did not have tooth decay present. Which of the following findings is true?

- A. The composition of the microbiomes was different, but the abundance was the same.
- B. The composition of the microbiomes and the abundance of various bacteria were different.
- C. The composition of the microbiomes was the same; however, the abundance of certain bacteria was different.
- D. None of the above

16. Which of the following include all true side effects of inhaler use?

- A. Hyposalivation, glossitis, decreased pH of saliva
- B. Hyposalivation, glossitis, increased pH of saliva
- C. Hypersalivation, glossitis, decreased pH of saliva
- D. Hypersalivation, glossitis, increased pH of saliva

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QUESTIONS

17. What are other medical terms used to describe seasonal allergies?

- A. Allergic rhinitis
- B. Hay fever
- C. Both A and B
- D. None of the above

18. How are seasonal allergies best diagnosed and classified?

- A. Temporal pattern, frequency, triggers
- B. Temporal pattern, frequency, severity
- C. Onset, frequency, severity
- D. Onset, frequency, triggers

19. What are common household triggers for allergic rhinitis?

- A. Urine
- B. Dry skin
- C. Pet dander
- D. All of the above

20. Geographically, where is hay fever most common in the US?

- A. Northeast
- B. Midwest
- C. South
- D. Southwest

21. Please select an answer that includes the most common medications used to treat seasonal allergic rhinitis.

- A. Oral first-generation antihistamine, inhaled corticosteroid, intranasal antihistamine
- B. Oral first-generation antihistamine, intranasal corticosteroid, topical antihistamine
- C. Oral second-generation antihistamine, inhaled corticosteroid, intranasal antihistamine
- D. Oral second-generation antihistamine, intranasal corticosteroid, intranasal antihistamine

22. Which of the following is a common side effect of second-generation oral antihistamines used to treat allergic rhinitis?

- A. Epistaxis
- B. Pharyngitis
- C. Xerostomia
- D. None of the above

23. Which of the following medications used to treat allergic rhinitis can induce asthma as a side effect?

- A. Oral antihistamines
- B. Inhaled corticosteroids
- C. Both A and B
- D. None of the above

24. Which of the following recommendations are similar among patients with both asthma and allergic rhinitis?

- A. If possible, limit exposure to allergen or trigger.
- B. Use inhaled corticosteroids when necessary.
- C. Developed an asthma action plan with your provider.
- D. None of the above

25. Among patients with allergic rhinitis, which of the following best describes their risk for oral disease?

- A. Increased risk for tooth decay in primary and transitional dentition
- B. Increased disease severity
- C. Increased dental visits for treatment of disease
- D. All of the above

26. Patients with asthma and allergic rhinitis often present with similar changes to the oral cavity. Which of these symptoms is not similar between asthma and allergic rhinitis?

- A. Increased salivary flow rate
- B. Mouth breathing
- C. Altered microbiome
- D. None of the above

27. Many patients with allergic rhinitis take antihistamines for symptom relief. Which of the antihistamines is a second-generation antihistamine associated with xerostomia?

- A. Loratadine
- B. Diphenhydramine
- C. Fexofenadine
- D. Brompheniramine

28. Which of the following should you review with patients who present to your office with asthma?

- A. Antihistamine action plan
- B. Allergy action plan
- C. Anti-allergy action plan
- D. Asthma action plan

29. Which of the following habits best helps patients return their oral pH back to normal after using an inhaler?

- A. Drinking bottled water
- B. Rinsing with water
- C. Chewing xylitol gum
- D. Waiting 30 minutes

30. When using an intranasal corticosteroid such as fluticasone propionate, which of the following is a common result?

- A. Reversible ciliostasis
- B. Irreversible ciliostasis
- C. Reversible ciliopathy
- D. Irreversible ciliopathy

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EXPIRATION DATE:	NOVEMBER 2023

Asthma, allergic rhinitis, and tooth decay

Name: _____ Title: _____ Specialty: _____

Address: _____ Email: _____ AGD member ID (if applies): _____

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

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EDUCATIONAL OBJECTIVES

- Understand the impact of asthma and seasonal allergies locally (for the patient) and nationally
- Review the current treatment recommendations for asthma and seasonal allergies
- Compare and contrast how both disease processes and their subsequent treatments can impact oral health
- Discuss how changing patient behaviors and using innovative products can improve oral health in patients with asthma and allergic rhinitis (AR)

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?

Mail/fax completed answer sheet to:

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| 15. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 30. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |

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All questions have only one answer. If mailed or faxed, grading of this examination is done manually. Participants will receive confirmation of passing by receipt of a Verification of Participation form. The form will be mailed within two weeks after receipt of an examination.

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COURSE CREDITS AND COST

All participants scoring 70% or higher on the examination will receive a verification form for three (3) continuing education (CE) credits. Participants are urged to contact their state dental boards for CE requirements. The cost for courses ranges from \$20 to \$110.

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