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The Role of the Dental Professional in Tooth Whitening

A Peer-Reviewed Publication
Written by Stacey L. Simmons, DDS

Abstract

The desire to obtain that “perfect white smile” has given rise to a billion-dollar industry that bombards the general public on a daily basis. There is an abundance of information available on how to obtain ideal results, with catchphrases that reel consumers in without the advice and expertise of a dental professional. It can be surmised then that the general public’s perception of the importance of professional guidance to whitening is devalued because answers and products are readily obtained via other venues (internet, dental kiosks, etc.). The intent of this article is to address the most common questions of teeth whitening while placing emphasis on the need and significance of the dental professional in the overall process.

Educational Objectives

At the conclusion of this educational activity participants will be able to:

1. Address the most common questions dental professional have with regards to the bleaching process.
2. Understand that bleaching has a strong presence in the public’s interest and that dental professionals are an important part of the equation for patients to obtain healthy, optimal results.
3. Understand the chemistry of bleaching and what factors make it most effective.
4. Give the different options for bleaching and understand the various ways the process can be customized

Author Profile

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Author Disclosure

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Abstract

The desire to obtain that “perfect white smile” has given rise to a billion-dollar industry that bombards the general public on a daily basis. There is an abundance of information available on how to obtain ideal results, with catchphrases that reel consumers in without the advice and expertise of a dental professional. It can be surmised then that the general public's perception of the importance of professional guidance to whitening is devalued because answers and products are readily obtained via other venues (internet, dental kiosks, etc.). The intent of this article is to address the most common questions of teeth whitening while placing emphasis on the need and significance of the dental professional in the overall process.

Introduction

Nowadays, if something isn't available immediately, it gets dismissed, forgotten, or considered inconvenient. We move on. This shift in how consumers think and act may not always be in their best interest. This attitude is also evident with regard to tooth whitening. As dental professionals, we believe we should be involved in the tooth whitening process. However, from a consumer standpoint, if they are able to obtain a whiter smile without the investment and guidance of a dental professional, our importance in the process can be questioned or invalidated.

Why should dental professionals be involved in the tooth whitening/bleaching process?

Let's admit it, it's a lot easier and cheaper to just go to the drug-store (or online) and purchase bleaching materials. The patient avoids a phone call, an office visit, an exam fee, and any other “unwanted or hidden costs” that may accompany a professional assessment. A dental professional may say the patient needs X, Y, and Z before bleaching can commence, and yet, all the patient wants is their teeth bleached.

Nearly everyone can bleach their teeth, but the objective is not always achieved because of factors that are beyond the patient's control or conditions that are not understood. The bleaching process seems simple, but in reality, it can be complicated and frustrating if not approached in a prudent and

pragmatic manner. This is the take-home point that consumers need to understand.

A full and complete dental examination is mandatory to assess those things that can have an impact on the success of bleaching (e.g., caries, dark or failing restorations, disease, etc.). Understanding patient goals and educating them about realistic expectations is not unreasonable, despite what media leads people to believe.

In addition, the American Dental Association's Council on Scientific Affairs supports and encourages the involvement of the dental professional in any whitening regimen.

Indications and contraindications for bleaching

Not every patient is a candidate for bleaching; however, on the flip side, there are many circumstances that make bleaching ideal.

Indications for bleaching include: aging, generalized staining/discoloration, tetracycline staining, and pulp changes due to trauma.

Contraindications include: recession/severe dentin exposure, existing restorations in the smile zone, decay/unrestored teeth and/or periapical lesions, unrealistic expectations, pregnancy, cracks with exposed dentin, dry mouth, and poor oral hygiene. In many instances, the reasons not to move forward can be addressed, thus emphasizing the need for professional involvement in the whitening process.

One of the most difficult patients to treat is the patient with unrealistic expectations.⁵ In these instances, it is important to maintain consent forms, pre-/post-bleach photos with shade verifications, limitations, and documentation to track progress (or lack thereof).

Classifications of staining: extrinsic and intrinsic

There are two types of staining—extrinsic and intrinsic.

Extrinsic discolorations occur when chromogens, the colored components found in fluids, are deposited and accumulate on the pellicle layer of the tooth or in the cracks, pits, and flaws of the enamel.^{3,4} Staining is most observed with substances with high polyphenolic compounds such as tobacco, red wine, darkly brewed tea, coffee, grapes, spices, dark colored vegetables/fruits, etc. Extrinsic staining also occurs when the chromogens attach to another element to produce the stain. Some of these agents include chlorhexidine and iron supplements. The easiest and most effective way to remove extrinsic stain is via mechanical instrumentation, ultrasonic scalers, and abrasive polishing pastes.

Intrinsic staining is discoloration that is internal to the outer layer of the tooth, in which dark pigmented molecules are incorporated into the substructures of the tooth. There can be multiple causes for intrinsic stain including genetics (blue-gray color vs. yellow-brown color), iatrogenic (tetracycline ingestion), aging (thinning enamel) and secondary and tertiary dentin deposition, trauma (pulpal hemorrhaging, root resorption), and metabolic.³ Intrinsic staining is removed via chemical means.⁴

The chemistry behind bleaching

The main active ingredients for bleaching compounds include hydrogen peroxide and carbamide peroxide. When assessed chemically, carbamide peroxide contains 3.5 parts hydrogen peroxide and 6.5 parts urea; subsequently a 10% gel contains 3.5% hydrogen peroxide.⁷ The hydrogen peroxide is the main active bleaching agent in whitening materials.

How does the actual process of bleaching work? Once the bleaching agent (liquid, gel, etc.) comes into contact with the tooth, the hydrogen peroxide component breaks down into water and free radicals, which then penetrate through the enamel pores. These bleaching components diffuse past the DEJ (dentinoenamel junction) into the dentin and then break down the conjugated bonds in pigmented materials, thus changing their configuration and size. When this happens, the optical properties are altered, resulting in the perception of a whiter tooth.⁷

Clinically, both carbamide peroxide and hydrogen peroxide produce comparable results; however, because carbamide peroxide undergoes a breakdown process, the activation and wear time can be longer, in particular for anhydrous or low-water-containing products.⁸ Carbamide peroxide is a simple complex of urea and hydrogen peroxide. In gels with significant water content, the complex is broken and the hydrogen peroxide is free, requiring no additional decomplexing. Complex breakdown is necessary in the case of anhydrous gels.

Factors that affect tooth color and the effectiveness of the bleaching process

One of the most common questions patients ask with regard to bleaching is: “How long do I need to bleach my teeth?” The effectiveness of bleaching can be impacted by many things: age, initial tooth color, gender, percentage of bleach material, total contact time, application method (custom trays, over-the-counter trays), existing restorations, extrinsic stain removal prior to bleaching, etc. Understanding these variables will subsequently lead to a more ideal outcome.^{7,13,5} Considerations when discussing the bleaching process with patients include:

- Yellow and brown-based teeth whiten faster than blue-gray teeth.⁴
- Patients who are younger have a higher magnitude of response to bleaching than older patients.
- Whitening benefits are similar in patients with staining habits (e.g., smoking, drinking coffee, tea, or red wine) and those without these habits.
- Post-bleaching and shade maintenance regimens may need to be considered, as color returns to teeth in a relatively short period of time. Habits and lifestyle will affect this.
- Tetracycline stained teeth (due to minocycline being absorbed into the tooth structure) can be successfully bleached; however, the gray color is never completely lost.²
- Dental restorations such as amalgams may influence tooth color depending on the thickness and translucency of the remaining tooth structure.

What patients sometimes don't realize is that the genesis for dark teeth is often *not* due to extrinsic staining but necrosis, internal resorption, old and debonded resins, or dark crowns.² For a single dark tooth, a periapical radiograph with pulp testing may be necessary. The patient may need to be prepared for an additional financial burden of a resin, crown, or restoration replacement.² In addition, assessing the health of the bone and tissue is warranted; recession and periodontal disease will have an effect on the success of bleaching.

As to the question of how long the patient will need to bleach their teeth, many patients think they should bleach until the desired whiteness is achieved. While attaining whiter teeth is the intent, educating patients on realistic expectations with regard to the aforementioned points will add value to the process and experience.

Understanding the options for bleaching

Regardless of which bleaching procedure a patient chooses; the basic principle is the same: discolored dentition is exposed to various forms of hydrogen peroxide over a period of time with the intent to lighten the color. There are numerous competing products and delivery systems for in-office, at-home, and over-the-counter use.¹⁰ Depending on the circumstances, a patient may prefer one procedure or delivery method over another, and individual tailoring is warranted. Regardless, an exam and full assessment should be emphasized to ensure a healthy mouth and that the patient's expectations can be met.

In-office whitening

With regard to in-office whitening, a higher concentration of bleach is used (typically 25-40%). In this controlled setting, the patient will typically undergo one to three 15 to 30-minute applications of bleach time. Although changes are noted after the first visit, the desired whiteness of the teeth is achieved usually after the second or third visit.²

Interestingly enough, manufacturers and anecdotal evidence suggest that in-office bleaching is more effective than at-home methods because the higher concentrations of bleach are superior and faster than the lower concentrations. However, research suggests the opposite—that the at-home techniques have a higher acceptance rate in the long run. This is due in part to the at-home techniques being more patient friendly, efficient, and cost effective as a result of flexible regimens and lack of chair time.^{11,15} Considerations for maintenance whitening and any additional needs should be reviewed.

Take-home/dentist-dispensed custom bleach trays

The fabrication of custom trays was first introduced in the late 1980s and has gained in popularity as a safe and effective way to whiten teeth as a dentist-prescribed, home-applied bleaching technique. It offers several advantages to the patient.

First, because of professional intervention and guidance, bleaching commences under ideal circumstances and optimal

results are more likely to be achieved. Secondly, patients are able to bleach in a manner that fits with their particular lifestyle and schedule. By emphasizing this point, a patient is more likely to agree to treatment because it doesn't interfere with commitments. Thirdly, because of the capacity to customize a bleaching routine, overall satisfaction is higher and can be maintained with subsequent bleaching touch up events. Even though there may be an up-front cost associated with this bleaching system, patients can enjoy long-term benefits with minimal investment. Furthermore, this technique is supported by research that supports its efficacy, long-term effect on teeth, and overall patient satisfaction.

With the custom tray system, the whitening agent is trapped between the surface of the tooth and the tray. This viscous gel typically ranges between 6% and 15% for hydrogen peroxide and 10% to 35% for carbamide peroxide. Wear time ranges from 30 minutes to eight hours per application. Take-home instructions are customized by time worn and frequency of application, which is dependent on gel concentration and patient sensitivity.

The delivery method for take-home systems is advantageous because the tray is easily and inexpensively fabricated in the office and custom fit for the patient. This eliminates excess gel onto the gingival tissues, which reduces gingival irritation. Trays can be made with or without reservoirs on the facial surface. Reservoirs provide an increased quantity of bleach exposed to the tooth, which in turn creates a greater whitening effect because oxygen ions are released over a longer period of time.^{10, 12}

Over-the-counter (OTC) bleach systems

The direct-to-consumer approach is a popular and effective way for manufacturers to provide easy resources for individuals to obtain whiter smiles. Hundreds of take-home products, including toothpastes, dental floss, mouth rinses, paint-on gels/liquids, chewing gums, etc., are available over-the-counter. Studies have shown that while these products vary in effectiveness, they can effectively help maintain post-bleaching results. However, the direct application of a bleaching agent itself produces better results.

One-size-fits-all bleach strips/trays are a common OTC approach that utilizes flexible polyethylene strips/trays that

are coated with a peroxide based bleaching gel.^{13,14} Upper and lower trays or strips are directly placed onto the teeth and left on for a specified period of time. While the bleach concentrations are typically lower the most common complaints are soft-tissue irritation, due to lack of custom fit, and tooth sensitivity.

Research supports the utilization of bleach trays and strips as a well-tolerated, safe, and effective option to recommend to a broad range of patients.

Other nondental settings

Patients may choose the convenience of “in-office whitening results” with the increased presence of whitening offered at mall kiosks, salons, spas, and cruise ships. While the regulations are varied, the control and oversight for safe, effective bleaching and long-term follow-up for any adverse effects are negated, and these options should be regarded with caution.⁵

Bleach concentrations and wear times

Since most bleach systems use a percentage of either carbamide peroxide or hydrogen peroxide (or a combination), it can be confusing as to the recommended wear time for each percentage. Understanding the breakdown is key. For example, by weight, carbamide peroxide contains 33% hydrogen peroxide, so a bleaching gel with 10% carbamide peroxide contains approximately 3.3% hydrogen peroxide.

Typically, carbamide peroxide based products can have longer wear times because of the breakdown process that it must undergo. However, since individual teeth respond to treatment differently, this is only a guideline and modifications may need to be made.⁵ As expected, when comparing the different percentages, studies indicate that over a period of time, the higher concentrations of carbamide peroxide (10% vs. 15%) do lighten teeth more significantly than the lower concentrations; additionally, the higher concentrations may increase tooth sensitivity for some users.²²

Table 1 gives a general reference to assess bleaching agents and their application times. Product variations and manufacturer instructions/guidelines must be followed for specific products.^{8, 13, 22, 23} Alterations in bleach time can be affected due to the presence of fluoride and/or potassium nitrate, which reduces caries, strengthens enamel, and reduces sensitivity.

Table 1:

APPLICATION	AGENT	SOURCE	CONCENTRATION	ESTIMATED WEAR TIME
In-office bleaching	Hydrogen peroxide Carbamide peroxide	Dentist/hygienist applied	25-40% 35%	1-3 treatments at 15-30 min each session
Custom bleach trays	Carbamide peroxide Hydrogen peroxide	Dentist dispensed	10-35% 6-10%	30 minutes to 8 hours
Polyethylene/whitening strips	Hydrogen peroxide	Over the counter	5-10%	5-60 minutes, 1-2 times a day

† Some products may contain combinations of carbamide and hydrogen peroxides

Risks and effects of the bleaching process

Tooth whitening and the use of hydrogen peroxide have been available for more than 100 years. Until 1989, bleaching was done primarily in the dental office, in a controlled, dentist-supervised environment. With the introduction of at-home whitening, the ability to advise and oversee was diminished. Regardless of the setting, candid discussions concerning the effects of the bleaching process are necessary.

When used properly and as intended, the risks and concerns of bleaching are minimal. In general, the severity of the side effects is directly related to the bleach concentration and duration of exposure/treatment. Understanding this will deter from the overuse and misuse of bleach products, thereby preventing adverse effects.

Toxicity

The literature reports that—when used appropriately—low concentrations of hydrogen peroxide generate minimal negative consequences.^{7, 16} However, safety mechanisms are still built in to the bleaching process to prevent misguided or accidental mishaps. For example, due to the higher percentage of bleach utilized with in-office systems, a rubber dam or a resin barrier should be placed to protect soft tissues and prevent ingestion. Custom take-home trays, when fabricated properly, reduce or eliminate the expression of excess bleach onto the tissue, thereby preventing ingestion of the bleaching material.

Gingival/soft tissues

One of the most common complaints with bleaching is burned, hypersensitive gum tissues in addition to corroded mucus membranes.^{1, 15, 17} It is well established that the higher peroxide concentrations produce more severe burns to the gingival tissues.¹⁷ The burned tissue is reversible and long-term damage or consequences are insignificant. Treatment, if needed, includes a thorough rinse, application of topical anesthetics, and vitamin E application.

Tooth sensitivity

One half to two thirds of patients who bleach report tooth sensitivity in the early stages of bleaching.^{7, 17} While the mechanism is not fully understood, it is believed that the reversible pulpal response is created by the passage of peroxide into the pulp chamber via dentin tubules.⁷ Age and gender do not appear to have an effect on the severity of sensitivity; however, frequent reapplication of bleach material in one session will increase the risk of patient discomfort.^{7, 17} Patients who present with recession and dentin exposure will report higher incidences of sensitivity. Treatment modalities include desensitizing gels and agents such as potassium nitrate, modifying the frequency and time of bleach application (e.g., every other day instead of every day), and decreasing bleach concentration.

Alterations/adverse effects in enamel and restoration integrity

Enamel

In several in-vitro studies, aggressive bleaching—or going beyond the scope of the bleach material's recommended use—has resulted in enamel softening, surface roughness, and an increase in tooth demineralization.¹⁸ The degree to which the teeth are affected, however, is a reflection on the technique used along with the concentration and duration of the bleaching process. When recommendations for use are followed, there is a slight loss of minerals and change in enamel morphology; however, there does not appear to be a significant risk or detriment to the enamel due to the capacity of the tooth to remineralized in the oral cavity.^{7, 16}

Restorations

- Amalgams – Minor effects with regard to micro hardness and roughness; changes are minimal and within an acceptable range.²⁰
- Resins—There are numerous studies that indicate changes in the integrity of resin restorations with regard to hardness, increased staining, surface roughness, and micro leakage. Bond strength is also reported to be adversely affected.^{7, 16, 20}
- Porcelain/ceramic restorations—A decrease in micro hardness and increased surface roughness has been reported, potentially leading to altered esthetics.²⁰

Adolescent and young adult bleaching

Peer pressure, social media, and image awareness influence young adults and adolescents to desire whiter teeth. With OTC availability of whitening agents, there is an increased potential for abuse due to compliance issues and undeveloped self-discipline.

In 2004, the American Academy of Pediatric Dentistry adopted a policy on bleaching for child and adolescent patients,¹⁹ which encourages the judicious use of bleaching for the aforementioned groups of patients and discourages full-arch cosmetic bleaching for mixed dentition patients.¹⁹

While bleaching is sometimes recommended in younger patients (e.g., nonvital pulp due to trauma, discoloration post-ortho removal, etc.), strict guidelines must be followed under the supervision of parents and licensed dental professionals. In general, conservative treatment is recommended, as well as the need for continued research on treatment regimens and protocol.

Conclusion

Teeth whitening will continue to be a desirable aspect of dentistry. It is therefore crucial that the dental professional has the knowledge and ability to advise, direct, and intervene—when necessary—for the benefit of our patients.

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Questions

1. With regard to whitening, the general public perceives that:
 - a. a dental professional is not always needed.
 - b. getting results faster and more immediately is expected.
 - c. dental professionals need to validate their importance in the whitening process.
 - d. all of the above.
2. The whitening process is:
 - a. more effective and valued when a dental professional is involved.
 - b. something anyone can do and subsequently achieve the desired results.
 - c. not impacted by circumstances out of the patient's control.
 - d. supported by the American Dental Association as an option for patients unable to see a dentist
3. Indications for bleaching do not include:
 - a. age.
 - b. recession.
 - c. trauma resulting in necrosis.
 - d. staining and discoloration.
4. What are some contraindications for bleaching?
 - a. unrealistic expectations
 - b. pregnancy
 - c. restorations in the posterior
 - d. a and b
5. Which is not true regarding potential bleach candidates?
 - a. Patient's oral hygiene
 - b. Difficult patients are easy to please once you start bleaching their teeth.
 - c. The exam can segue into addressing or treating other dental needs.
 - d. Record keeping and documentation should be thorough and include before- and-after photos.
6. Extrinsic staining:
 - a. occurs when chromogens are deposited on the pellicle layer of the tooth.
 - b. can accumulate in the cracks, pits, and flaws in the enamel.
 - c. occurs with high polyphenolic compounds such as those found in tobacco, tea, and red wine.
 - d. All of the above
7. When chromogens attach to other elements such as chlorhexidine and iron supplements:
 - a. the bleaching process becomes easier.
 - b. additional staining occurs.
 - c. mechanical instrumentation and abrasive polishing pastes are not effective means of removal.
 - d. none of the above.
8. When comparing intrinsic and extrinsic staining, which of the following is true?
 - a. Intrinsic staining occurs when dark pigmented molecules incorporate into the substructure of the tooth.
 - b. Genetics, aging, and trauma are common causes for both.
 - c. Both can be effectively removed via chemical means.
 - d. b and c
9. When looking at the breakdown of carbamide peroxide, chemically:
 - a. it contains 3.5 parts urea.
 - b. it contains 6.5 parts hydrogen peroxide.
 - c. none of the above.
 - d. a and b
10. Hydrogen peroxide:
 - a. breaks down into water and free radicals.
 - b. is a breakdown product of carbamide peroxide.
 - c. is the active ingredient in the bleaching process.
 - d. all of the above.
11. A 15% carbamide peroxide gel:
 - a. contains 3.5% hydrogen peroxide.
 - b. contains approximately 5.25% hydrogen peroxide.
 - c. contains 6.5% urea.
 - d. a and b
12. How does the bleaching process work?
 - a. The free radicals diffuse past the DEJ into the dentin.
 - b. The conjugated bonds in the pigment are broken down, altering the size and configuration.
 - c. The optical properties are altered, thus changing the perceived color of the tooth.
 - d. All of the above.
13. Which of the following is true when comparing carbamide peroxide and hydrogen peroxide?
 - a. The wear time is similar.
 - b. The results are comparable and effective.
 - c. a and b
 - d. None of the above.
14. Factors that affect tooth whitening include all of the following except:
 - a. age, gender, contact/application time.
 - b. existing restorations.
 - c. intrinsic stain removal.
 - d. all of the above.
15. A patient's teeth may be dark due to:
 - a. necrosis.
 - b. internal resorption.
 - c. old debonded resins/restorations.
 - d. all of the above.
16. All of the following regarding in-office whitening are true except:
 - a. bleach concentrations range from 10-20%.
 - b. it utilizes one to three 15 - to 30-minute sessions of bleach exposure time.
 - c. desired results are achieved usually after the 2nd or 3rd visit.
 - d. research suggests that this method is not more favorable than other bleaching options.
17. Which of the following make the take-home bleaching method favorable?
 - a. higher compliance rates due to less interference in lifestyle
 - b. dentist intervention and oversight
 - c. capacity to customize the delivery system/bleach tray
 - d. all of the above
18. The whitening agents for take-home systems:
 - a. are trapped between the tooth and the reservoir.
 - b. range between 20-40%.
 - c. vary with application times due to bleach concentration and frequency.
 - d. a and c
19. Advantages to custom tray utilization include all of the following except:
 - a. tray fabrication is time consuming.
 - b. excess expression of gel is limited due to the custom fit.
 - c. tray reservoirs increase the amount of bleach exposed to the tooth.
 - d. they provide a long-term benefit with minimal investment for the patient.
20. Which of the following is true regarding the different types of bleaching products available over-the-counter?
 - a. They include toothpastes, gels, gums, and rinses.
 - b. Studies show that their whitening effectiveness varies.
 - c. They are not effective with post-bleaching maintenance.
 - d. a and b
21. Over-the-counter bleach strips have the following properties except:
 - a. coated with a peroxide based gel
 - b. rigid in structure to help hold them in place
 - c. contain lower bleach concentrations
 - d. effective on a broad range of patients for a variety of reasons

The Role of the Dental Professional in Tooth Whitening

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

1. Address the most common questions dental professional have with regards to the bleaching process.
2. Understand that bleaching has a strong presence in the public's interest and that dental professionals are an important part of the equation for patients to obtain healthy, optimal results.
3. Understand the chemistry of bleaching and what factors make it most effective.
4. Give the different options for bleaching and understand the various ways the process can be customized

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: 918-212-9037

For IMMEDIATE results,
 go to www.DentalAcademyOfCE.com to take tests online.
INSTANT EXAM CODE 15241
 Answer sheets can be faxed with credit card payment to
918-212-9037.

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: _____
 Exp. Date: _____

Charges on your statement will show up as PennWell

- | | |
|---------------------|---------------------|
| 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) |
| 6. (A) (B) (C) (D) | 21. (A) (B) (C) (D) |
| 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 781

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: hhodges@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.

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 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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