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DACE DENTAL ACADEMY of CONTINUING EDUCATION

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ABSTRACT

A white spot lesion (WSL) is an early-stage carious lesion that presents clinically as an area of increased whiteness and opacity in the enamel. WSLs may occur independently of orthodontic therapy as a result of poor oral hygiene; however, they are commonly associated with postorthodontic treatment outcomes. Around one half of orthodontic patients will develop one or more WSLs following orthodontic treatment. The best way to manage WSLs is to prevent them from forming in the first place. When this is not possible, dental health-care providers may use minimally invasive treatments such as microabrasion or resin infiltration to minimize the effects of WSLs and restore optimal esthetics.

EDUCATIONAL OBJECTIVES

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

1. Identify the etiological factors that contribute to the development of white spot lesions
2. Explore evidence-based insights into the latest advancements in clinical approaches for the prevention of WSLs, including remineralization techniques
3. Gain proficiency in the application of minimally invasive procedures such as microabrasion and resin infiltration for the effective treatment of existing WSLs
4. Acquire practical knowledge and strategies that enable dental professionals to proactively address WSLs during and after orthodontic treatment, ultimately optimizing treatment outcomes and enhancing patient satisfaction

Evidence-based management of white spot lesions

A PEER-REVIEWED ARTICLE | by Logan Smith, DDS

Dental caries, a condition marked by an imbalance between demineralization and remineralization, poses a significant challenge in oral health maintenance. The etiology of caries involves the dissolution of enamel caused by organic acids produced by plaque bacteria. Fixed orthodontic appliances exacerbate this challenge by impeding conventional oral hygiene practices, leading to an increased cariogenic environment around orthodontic brackets and bands.[1] As a consequence, the incidence of carious lesions, particularly on facial surfaces of both anterior and posterior teeth, escalates during treatment with fixed orthodontic appliances.[1] These lesions, characterized by their early appearance as white opaque spots on the enamel, pose an esthetic concern and may undermine the overall treatment outcomes (figure 1).

WSLs have been defined as "subsurface enamel porosity from carious demineralization" that presents as "a milky white opacity ... when located on smooth surfaces."[2,3] Various terms, such as initial enamel lesions or demineralized lesions, are

used interchangeably with WSLs to describe early-stage carious lesions characterized by increased whiteness and opacity in the enamel.

Studies have shown that, by the conclusion of treatment, WSLs were observed in 30%–51% of patients undergoing orthodontic treatment with fixed appliances.[4-7] Nonorthodontic patients may also develop WSLs. The prevalence for nonorthodontic patients has been reported from 0%–27%, depending on the tooth.[7] Since the prevalence of WSLs is significantly higher in orthodontic patients, they are commonly associated with orthodontic treatment with fixed appliances.

In light of these challenges and the clinical implications associated with WSLs, understanding their etiology, characteristics, and management strategies becomes imperative in dental and orthodontic practice. This article aims to help the reader better understand WSLs, how to incorporate preventive measures, and provide minimally invasive treatment modalities to address this common complication of fixed orthodontic therapy.

FIGURE 1: (a) Mild and (b) severe clinical examples of white spot lesions

Preventing white spot lesions

Benjamin Franklin famously said, "An ounce of prevention is worth a pound of cure." It is easier to prevent WSLs from occurring in the first place rather than repair the lesions after they have occurred. When it comes to preventing WSLs, different forms and doses of fluoride are the most researched interventions. Other interventions have been studied in more recent research, which may show promise in preventing WSLs during orthodontic treatment.

Fluoride: Fluoride is the most common chemical agent in preventing carious lesions, so naturally it is also the most researched intervention in preventing WSLs during orthodontic treatment. Multiple systematic reviews with meta-analysis confirm that fluoride toothpaste effectively prevents dental caries.[8,9] Despite the clear, high-quality evidence that fluoride toothpastes are efficacious in preventing caries in the absence of fixed orthodontic appliances, the evidence for using fluoride to prevent WSLs during orthodontic treatment is not as clear. Below is a summary of the findings from a recent systematic review with meta-analysis on the topic of various types of fluoride for preventing early tooth decay during fixed orthodontic treatment.[10]

The evidence regarding the effectiveness of professional application of fluoride varnish (at 7,700 ppm or 10,000 ppm fluoride concentration) every six weeks in reducing new WSLs among patients with fixed orthodontic braces is inconclusive based on two clinical trials.[10] Similarly, one study suggests a low level of certainty regarding the efficacy of a 12,300 ppm fluoride foam applied professionally every two months in reducing the incidence of new WSLs post-fixed-orthodontic treatment.[10]

Regarding at-home fluoride products, one trial suggests that using a high fluoride (5,000 ppm) toothpaste throughout orthodontic treatment with fixed appliances may decrease the number of patients with new WSLs, albeit with low certainty.[10] Evidence is also insufficient to recommend using fluoride-containing materials for attaching braces or intraoral fluoride-releasing devices. While such interventions have the potential to be

effective by sustaining fluoride release and reducing patient adherence requirements, there is insufficient evidence to support their effectiveness. Additionally, while fluoride mouth rinses combined with fluoride toothpastes have effectively reduced caries in nonorthodontic patients, direct evidence supporting their efficacy in reducing WSLs during fixed orthodontic appliance treatment is lacking.[10]

The evidence shows that fluoride is indeed effective in preventing carious lesions from developing and progressing in patients not undergoing orthodontic treatment with fixed appliances.[10] However, the highest quality level of evidence, the systematic review with meta-analysis, shows mixed results on the ability of various forms of fluoride (i.e., varnishes, foams, toothpastes with increased concentrations, and even fluoride-releasing orthodontic adhesives) to prevent carious lesions from developing during orthodontic treatment and becoming WSLs. Of the fluoride interventions with low-quality evidence, the cost of materials and time spent applying these forms of fluoride make it unlikely that busy private practices and corporate orthodontic offices would apply these interventions at every orthodontic adjustment. Thus, fluoride alone cannot predictably be relied upon to prevent WSLs from forming during orthodontic treatment, especially in a pediatric and adolescent patient population.

CPP-ACP: Another preventive option is casein phosphopeptide-stabilized amorphous calcium phosphate complex (CPP-ACP). CPP-ACP's mechanism of action is as follows: CPP prevents demineralization by stabilizing phosphate and calcium ions, while ACP supplies these ions for remineralization.[11] WSLs occur when the rate of demineralization exceeds the rate of remineralization; thus, CPP-ACP should be an ideal tool for preventing WSLs.[11,12]

A recent in vitro study assessed how a resin-modified glass ionomer fluoride varnish (RMGIFV) compared with a casein phosphopeptide-stabilized amorphous calcium phosphate complex fluoride varnish (CPP-ACPFV).[12] The in vitro study also considered how acid etching the tooth surface before the application of CPP-ACPFV may impact the potential for resisting demineralization, by measuring changes in the enamel microhardness and surface texture. The results of the study showed that both RMGIFV and CPP-ACPFV were more effective in preserving enamel microhardness than the controls. Thus, both may be good options for reducing the risk of WSL development for a minimum of 12 weeks (the in vitro study simulated 12 weeks of conditions in an intraoral environment). Additionally, acid etching the enamel surface before applying CPP-ACPFV significantly improved the varnish's effectiveness and prolonged its efficacy in minimizing alterations in enamel microhardness and surface texture.[12]

The significant improvement in CPP-ACPFV effectiveness after acid etching may be explained by the impact of the acid etch on enamel, followed by the subsequent treatment with CPP-ACPFV. Acid etching on enamel removes inorganic and organic material on the enamel surface and exposes enamel crystals, which have a strong affinity for calcium and phosphate ions.[12,13] The CPP-ACPFV provides an abundance of calcium, phosphate, and fluoride, which increases enamel hardness and resistance to demineralization from acid attacks.[12,14,15] Thus, it is believed that acid etching prior to application of CPP-ACPFV encourages incorporation of fluoride ions deeper into the crystal lattice. This results in the formation of fluorohydroxyapatite (FHA), which exhibits a critical pH for demineralization below 4, contrasting with the critical pH of 5.5 for hydroxyapatite (HA).[14,15] If the results of this in vitro study can be replicated in an in vivo study or randomized controlled trial, then acid etching followed by treatment with CPP-ACPFV at the orthodontic bonding appointment, where braces are placed on teeth, may result in enamel that is more resistant to WSLs. However, since this is an in vitro study, one must keep in mind many limitations to this study and its place on the lower quality end of the hierarchy of scientific research evidence pyramid.

Other preventive options: Other options for preventing WSLs from developing in orthodontic patients with fixed appliances include behavioral techniques. In addition to using dentifrices with fluoride to encourage remineralization, patients need instruction on optimal diet and proper brushing techniques to keep their teeth free of bacteria and plaque around their brackets and wires. While these techniques also contribute to preventing WSLs, they are dependent upon patient compliance.[12] In fact, all of these preventive measures depend upon patient compliance to some degree. Whether it is routinely brushing and flossing, or making regular orthodontic appointments to ensure that fluoride or CPP-ACP treatment can be applied, patient compliance is prerequisite to minimizing WSLs during treatment. Unfortunately, in a pediatric and adolescent patient population—or even in an adult patient population—perfect compliance is never guaranteed.

Even in situations of perfect patient compliance with oral hygiene and the use of fluoride toothpaste around fixed orthodontic appliances, it may not be enough. How is this so? If the orthodontist or their assistant does not place enough orthodontic

adhesive on the bracket pad, it may leave a small void between the tooth surface and the bracket. Similar to interproximal areas and deep pits and fissures, plaque will find these voids, and the bacteria within the plaque will be able to flourish because it is impossible to mechanically debride in such a small crevice. Thus, it is essential that the contemporary dental health-care team provides means whereby WSLs can be effectively treated.

Treating white spot lesions

Despite a patient's best oral hygiene efforts, and despite a dentist's best efforts to prevent demineralization via fluoride or CPP-ACP, WSLs may still develop, and dentists along with their teams need to be well-versed in the options for managing the unesthetic appearance of these lesions. Historically, the options for treating WSLs were limited to (1) using fluoride to try to remineralize a lesion, or (2) waiting until it gets cavitated and then drilling and filling the cavity. In recent years, other techniques have proven to be effective in minimizing the effects of WSLs. In addition to remineralization, tooth whitening, microabrasion, and resin infiltration are alternative options for patients to heal their postorthodontic WSLs.

Remineralization: While remineralization was discussed as a preventive option, it remains a valid treatment recommendation for treating WSLs. There is ample research on the topic of remineralization of WSLs. One randomized clinical trial compared the differences between fluoride gel alone, CPP-ACP alone, and CPP-ACP with fluoride over a 90-day period. The results of this study showed that CPP-ACP is a good alternative to fluoride in terms of white spot remineralization, and the best remineralization results were achieved when CPP-ACP was combined with fluoride.[16]

Another randomized controlled trial compared twice-daily brushing with fluoride toothpaste alone to daily brushing plus application of fluoride varnish and daily brushing plus twice-daily application of CPP-ACP. The results showed that the use of 1,000 ppm fluoride toothpaste twice daily effectively remineralized WSLs, whereas there was no statistically significant added benefit from adding fluoride varnish or CPP-ACP to the daily fluoride brushing.[17]

A prospective study compared CPP-ACP with fluoride rinse and found that CPP-ACP was more beneficial than fluoride rinse for remineralizing postorthodontic WSLs.[18] Finally, a systematic review concluded that, based on the existing research on the topic, monthly use of fluoride varnish was the best supplemental treatment to remineralize WSLs and minimize the area of the lesion.[19] The authors of that systematic review did not include CPP-ACP in their study and suggested that further research is necessary in order to better understand how to best treat postorthodontic WSLs.

Treatment with various forms of fluoride and CPP-ACP are important in remineralizing WSLs to prevent progression from demineralized enamel to a cavitated lesion. Nevertheless, the studies that discuss remineralization as a treatment rarely discuss the esthetic appearance of WSLs. Studies that analyzed whitening, microabrasion, and resin infiltration focus more on the esthetic management of WSLs.

Whitening: The available literature on the topic of whitening or bleaching teeth to treat WSLs has mixed results. Some studies report that whitening provides significant benefits, while others suggest that whitening teeth may increase the contrast in the difference in the appearance of WSLs compared to healthy enamel, worsening the esthetic appearance.

In an in vitro study that analyzed extracted human teeth with existing WSLs, the authors compared the L-value of teeth that underwent whitening with bleaching gel containing 10% carbamide peroxide with potassium nitrate and fluoride, applied for eight hours per day for 14 days, following the manufacturer's instructions. The L-value corresponded to value, which is the most important characteristic of tooth shade.[20] The authors found that whitening treatment on the WSLs was able to mask 25% of the samples in the experiment.[21]

A case report suggested that whitening teeth in a patient with postorthodontic WSLs may minimize the color difference between the healthy enamel and WSL. The tooth whitening was followed by resin infiltration, which yielded excellent esthetic results.[22] Obviously, case reports have a sample size of one, so they are considered the lowest quality of evidence. On the opposite end of the hierarchy of evidence, a systematic review from one randomized controlled trial and seven in vitro studies showed that treating WSLs with tooth bleaching can minimize color disparities between demineralized and healthy enamel. However, due to the low quality of evidence in the study, the authors concluded that there is not strong enough evidence for or against tooth whitening as an effective treatment method for managing postorthodontic WSLs.[23]

Microabrasion: Microabrasion is a commonly used procedure to minimize the esthetic effects of postorthodontic WSLs. It involves the physical removal of the milky white, opaque enamel, resulting in a smooth, glossy surface.[24] As per manufacturer's instructions, a 6.6% hydrochloric acid slurry containing silicon carbide microparticles is applied to the

affected teeth, then a rubber prophy cup is used at a speed of 500 rpm for about 60 seconds.[21,25] The slurry is rinsed from the teeth and the procedure is repeated until satisfactory results are achieved. Several studies analyzed the microabrasion technique and compared it against other WSL treatments. The results were more consistent than those for tooth whitening, but some disparities in the results were noted between studies.

Two prospective studies, one randomized controlled trial, and one in vitro study all agreed that the microabrasion technique is effective for the cosmetic improvement of WSLs.[18,26-28] The in vitro study that reported esthetic improvement from microabrasion also reported that after undergoing discoloration treatments to simulate conditions in the oral environment, the esthetic results of the microabrasion-treated teeth were not as stable as teeth that underwent resin infiltration.[27]

Another in vitro study reported that when comparing remineralization, microabrasion, and resin infiltration, microabrasion performed the worst in terms of esthetic improvements and caused an increase in color value further away from healthy enamel.[21]

With the exception of one in vitro study, the body of literature supports microabrasion as an effective method for improving the esthetics of WSLs. Nonetheless, almost all of the studies included a caveat. Microabrasion was good at improving the esthetics of postorthodontic WSLs, but it was outperformed by resin infiltration in one way or another.

FIGURE 2: (a) Before and (b) after clinical example of patient treated with resin infiltration

Resin infiltration: The resin infiltration technique consists of etching the affected teeth with 15% hydrochloric acid for two minutes, which increases enamel porosity. Then the teeth are rinsed with water for 30 seconds and dried, after which 95% ethanol is applied to the WSL and air-dried. Then a highly viscous and highly penetrating resin infiltrant is applied on the WSL for three minutes and light cured for 40 seconds.[21,25] Additional layers of the resin infiltrant may be placed and light cured following the recommended manufacturer's guidelines as needed. The resin infiltrant stops the progression of demineralization and creates a barrier against future acid attacks.[25]

Like microabrasion, there is a strong body of evidence that supports the effectiveness of resin infiltration for improving the esthetics of WSLs (figure 2). Unlike microabrasion and other techniques, the evidence in favor of resin infiltration is consistent. One in vitro study, one prospective study, two randomized controlled trials, and one systematic review all reported statistically significant results that resin infiltration appears to yield the best esthetic results for WSL improvement.[20,21,25-28]

In addition to improving the demineralized lesion at the time of treatment, resin infiltration showed stability at six- and 12-months post-treatment.[20,26] Resin infiltration also showed stability against discoloration treatment in an in vitro bovine enamel model.[27] The systematic review agreed with the results of all of the studies and stated that in terms of esthetic improvement, resin infiltration is currently the most effective and most predictable treatment option.[25]

Evidence-based best clinical practice

Based on the evidence provided and discussed above, dental health-care providers always need to consider the quality of the level of evidence they are reading and be aware of any biases or conflicts of interest from the authors of studies.

Due to the high prevalence of WSLs, dental and orthodontic teams must focus on educating their patients on prevention via consistent oral hygiene practices with proper techniques and fluoride toothpaste. CPP-ACP may also be added to the routine, as long as the patient does not have a lactose allergy.

When WSLs develop even after best efforts to educate patients on prevention, the evidence suggests that resin infiltration will yield the best short- and long-term esthetic results to mask the lesions. Microabrasion will also improve esthetics, and it may be a less expensive and shorter procedure for the patient (depending on the extent of the lesion). Remineralization is the least invasive option, but it may not solve the esthetic problem.[25] However, it is best to begin with the least invasive options. Patients should be encouraged to try remineralization with either routine brushing with fluoride toothpaste or adding fluoride varnish or CPP-ACP to their routines.

If white spots remain a problem, patients may try bleaching or whitening to minimize the contrast between the demineralized and healthy enamel. If these two least invasive approaches leave patients with unesthetic white spots, then microabrasion or resin infiltration should be provided as treatment options, and patients should be educated on the potential benefits of each treatment.

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What is the primary challenge in maintaining oral health in individuals with fixed orthodontic appliances?

A. Increased tooth sensitivity
B. Excessive enamel thickness
C. Impeded conventional oral hygiene practices
D. Enhanced plaque removal

2. Which term is used interchangeably with white spot lesions to describe early-stage carious lesions?

A. Demineralized lesions
B. Superficial stains
C. Advanced enamel cavities
D. Deep enamel erosion

3. What percentage of orthodontic patients may develop white spot lesions by the end of treatment?

A. 30%–51%
B. 10%–20%
C. 60%–70%
D. 80%–90%

4. What is the primary focus of this article?

A. Difference between white spot lesions and root caries
B. Characteristics, prevention, and management of white spot lesions
C. Prevention of dental caries through diet control
D. Dental hygiene maintenance for orthodontic patients

5. Which preventive measure is highlighted as the most common intervention for preventing white spot lesions during orthodontic treatment?

A. CPP-ACP
B. Fluoride
C. Whitening
D. Charcoal toothpaste

6. Which term is used to describe the appearance of white spot lesions on smooth surfaces of the enamel?

A. Subsurface enamel lucency
B. Milky white opacity
C. Superficial enamel demineralization
D. Deep enamel cavitation

7. What percentage of nonorthodontic patients may develop white spot lesions?

A. 0%–27%
B. 30%–47%
C. 50%–61%
D. None of the above

8. Which chemical agent is highlighted as a newer intervention in preventing white spot lesions during orthodontic treatment that may show promise?

A. CPP-ACP
B. Fluoride
C. Whitening
D. Charcoal toothpaste

9. What type of evidence suggested that acid etching prior to the application of CPP-ACP fluoride varnish significantly reduced white spot lesion development?

A. Systematic review with meta-analysis
B. Randomized controlled trial
C. In vitro study
D. Case report

10. What is the critical pH for demineralization for fluorohydroxyapatite?

A. 4
B. 5
C. 7
D. Above 8

11. Which preventive option for white spot lesions prevents demineralization by stabilizing phosphate and calcium ions while providing a supply of these ions for remineralization?

A. Chlorhexidine rinse
B. Fluoride varnish
C. CPP-ACP
D. Acid etch

12. What is the potential benefit of acid etching the enamel surface before applying CPP-ACPFV?

A. To decrease enamel microhardness
B. To reduce the efficacy of CPP-ACPFV
C. To increase enamel affinity for calcium, phosphate, and fluoride ions
D. To increase plaque buildup

13. What is essential to minimize white spot lesions during treatment?

A. Proper compliance with optimal diet and brushing techniques
B. Routine use of fluoride toothpaste
C. Keeping regular orthodontic appointments
D. All of the above

14. What may occur if there is insufficient orthodontic adhesive on the bracket pad?

A. Increased enamel microhardness
B. Reduced plaque buildup
C. Formation of tiny voids between the tooth surface and bracket
D. Decreased white spot lesion development

15. What does CPP-ACP encourage?

A. Demineralization
B. Remineralization
C. Acid attacks
D. Plaque buildup

16. Which option is not mentioned to prevent white spot lesions during treatment?

A. CPP-ACP in addition to fluoride
B. Dentifrices with fluoride
C. Proper brushing techniques
D. Regular use of chlorhexidine rinse

17. What is the critical pH for demineralization for hydroxyapatite?

A. 4
B. 5
C. 7
D. Above 8

18. Which is an option for both preventing and treating white spot lesions?

A. Remineralization
B. Whitening
C. Microabrasion
D. Resin infiltration

19. Which treatment method involves physical removal of the milky white opaque enamel?

A. Remineralization
B. Whitening
C. Microabrasion
D. Resin infiltration

20. Which technique stops the progression of demineralization and creates a barrier against future acid attacks?

A. Remineralization
B. Whitening
C. Microabrasion
D. Resin infiltration

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PROVIDER INFORMATION

Dental Board of California: Provider RP5933. Course registration number CA code: 3-5933-22369. Expires 7/31/2024.

"This course meets the Dental Board of California's requirements for three (3) units of continuing education."

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AADH code: AADHEBM-330-1-2025-3

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21. What type of evidence suggested that tooth whitening prior to resin infiltration yields excellent esthetic results?
- A. Systematic review with meta-analysis
- B. Randomized controlled trial
- C. In vitro study
- D. Case report

22. In what way is microabrasion more effective at improving esthetics than resin infiltration?
- A. Better long-term esthetic stability
- B. Less resistant to discoloration
- C. Esthetics are closer to natural, healthy enamel
- D. None of the above

23. Which technique involves applying a resin infiltrant on the white spot lesion for three minutes and light curing for 40 seconds?
- A. Remineralization
- B. Whitening
- C. Microabrasion
- D. Resin infiltration

24. Which treatment option is the least invasive, thus making it a good first option, but may not solve the esthetic problem of white spot lesions?
- A. Remineralization
- B. Whitening
- C. Microabrasion
- D. Resin infiltration

25. Which type of study provides the highest quality of evidence?
- A. Systematic review with meta-analysis
- B. Randomized controlled trial
- C. In vitro study
- D. Case report

26. What is the most important characteristic of tooth shade measured by the L-value?
- A. Value
- B. Brightness
- C. Saturation
- D. Contrast

27. What does CPP-ACP stand for?
- A. Calcium phosphate peptide-acid
- B. Casein phosphopeptide-stabilized amorphous calcium phosphate complex
- C. Calcium peroxide phosphate-acid
- D. Casein phosphate peptide-aluminum calcium phosphate

28. Patients with which allergy should avoid using CPP-ACP?
- A. Lactose
- B. Gluten
- C. Peanuts
- D. Shellfish

29. What type of acid is typically used for microabrasion?
- A. 6% hydrofluoric acid
- B. 15% hydrochloric acid
- C. 6% hydrochloric acid
- D. 95% ethanol

30. What treatment is considered the most effective and predictable for esthetic improvement of white spot lesions?
- A. Remineralization
- B. Whitening
- C. Microabrasion
- D. Resin infiltration

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EXPIRES: **DECEMBER 31, 2028**

Evidence-based management of white spot lesions

NAME: TITLE: SPECIALTY:

ADDRESS: EMAIL: AGD MEMBER ID (IF APPLIES):

CITY: STATE: ZIP: COUNTRY:

TELEPHONE (PRIMARY): TELEPHONE (OFFICE):

REQUIREMENTS FOR OBTAINING CE CREDITS BY MAIL/FAX: 1) Read entire course. 2) Complete info above. 3) Complete test by marking one answer per question. 4) Complete course evaluation. 5) Complete credit card info or write check payable to Endeavor Business Media. 6) Mail/fax this page to DACE.

If you have any questions, please contact dace@endeavorb2b.com or call (800) 633-1681. A score of 70% or higher is required for CE credit.

COURSE CAN ALSO BE COMPLETED ONLINE AT A LOWER COST. Scan the QR code or go to dentalacademyofce.com to take advantage of the lower rate.

EDUCATIONAL OBJECTIVES

1. Identify the etiological factors that contribute to the development of white spot lesions
2. Explore evidence-based insights into the latest advancements in clinical approaches for the prevention of WSLs, including remineralization techniques
3. Gain proficiency in the application of minimally invasive procedures such as microabrasion and resin infiltration for the effective treatment of existing WSLs
4. Acquire practical knowledge and strategies that enable dental professionals to proactively address WSLs during and after orthodontic treatment, ultimately optimizing treatment outcomes and enhancing patient satisfaction

COURSE EVALUATION

1. Were the individual course objectives met?
   Objective #1: Yes No Objective #3: Yes No
   Objective #2: 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 author'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 references. 5 4 3 2 1 0
10. Do you feel that the references were adequate? Yes No
11. Would you take a similar course 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 dental continuing education topics would you like to see?

    _____

    _____

Mail/fax completed answer sheet to:
Endeavor Business Media
Attn: Dental Division; 7666 E. 61st St. Suite 230, Tulsa, OK 74133
Fax: (918) 831-9804

☐ Payment of $69 is enclosed (this course can be completed online for $39. Scan the QR code or go to dentalacademyofce.com to take advantage of the lower rate).

Make check payable to Endeavor Business Media

If paying by credit card, please complete the following:

☐ MC ☐ Visa ☐ AmEx ☐ Discover

Acct. number: _____

Exp. date: _____ CVC #: _____

Billing address: _____

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Charges on your statement will show up as Endeavor.

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3.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	18.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
4.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	19.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
5.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	20.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
6.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	21.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
7.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	22.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
8.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	23.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
9.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	24.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
10.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	25.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
11.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	26.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
12.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	27.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
13.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	28.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
14.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	29.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
15.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	30.	Ⓐ	Ⓑ	Ⓒ	Ⓓ

CUSTOMER SERVICE: (800) 633-1681

EXAM INSTRUCTIONS. 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.

COURSE EVALUATION AND FEEDBACK. We encourage participant feedback. Complete the evaluation above and e-mail additional feedback to Rachel McIntyre (rmcintyre@endeavorb2b.com) and Laura Winfield-Roy (lwinfield@endeavorb2b.com).

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.

CANCELLATION AND REFUND POLICY. Participants who are not 100% satisfied can request a refund by contacting Endeavor Business Media in writing.

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