

Bleaching Teeth During Supervised Retention

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Bleaching effectively brightens and whitens the teeth without any significant side effects. It can be logically included in a supervised retention regimen, because it is relatively simple, requires minimal chairtime, takes only two to three weeks, and demonstrably improves the esthetic appearance of a case—especially in adults.

Orthodontists are not in the bleaching business, nor should they be. Bleaching in an orthodontic practice should be limited to an esthetic augmentation during the retention phase. Bleaching does not last forever; it must be repeated at least every two or three years, when diet and lifestyles inevitably cause restaining. Repeat bleaching should be the responsibility of the referring dentist. The initiation of the process by the orthodontist, therefore, cannot be construed as an infringement on the purview of the general dentist. In fact, the specialist has created a clinical service requiring long-term maintenance by the referring dentist.

Physiologic Rationale for Bleaching

Bleaching is safe and condoned by the ADA when performed according to established guidelines. Several clinical trials have been published attesting to its non-pathological effect on teeth¹⁻⁴ and tissues.^{5,6} There is no change in enamel hardness, and the bacteriostatic properties of the bleaching gel inhibit the formation of caries.

Teeth can be bleached with heat and chemicals, in-office light and chemicals, or in-office lasers. The simplest and most effective technique for the orthodontist, however, is home use of carbamide peroxide bleach in professionally fabricated trays. This method, which is used by 63% of dentists,⁷ can easily be combined with supervised retention and requires minimal chairtime.

Hydrogen peroxide, the active ingredient in

all tooth-whitening products, is an oxidizing agent that combines with urea to form carbamide peroxide—a chemical that has been sanctioned by the FDA as a non-prescription oral antiseptic since 1974. To make a gel, carbamide peroxide is blended with an inert ingredient (glycerol, propylene glycol, or both) and thickened with a non-toxic carbopol that slows the release of oxygen. Flavoring is often added for taste. The teeth whiten when the hydrogen peroxide separates from the urea, penetrates the enamel, and oxidizes (bleaches) the stains. Urea, a naturally occurring chemical, is absorbed by the body.

Bleaching gels range in strength from 5% to 44% carbamide peroxide, with 10% and 15% the most popular concentrations for home use. The 15% strength is generally used for more prominent stains. Gels with less than 10% carbamide peroxide don't seem to be effective. Concentrations of 18% or more should be used carefully, and probably not by orthodontists; while they may reduce treatment time, they increase the risk of complications without significantly increasing the degree of whiteness.



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Possible Complications

In a recent survey, 91% of dentists said they used vital tooth bleaching with minimal side effects.⁸ Sixty-two percent noted mild, transient tooth sensitivity in 11% of their cases; 46% reported minor soft-tissue irritation in 6% of patients; and fewer than 2% noticed minimal systemic effects.

Causes of thermal and tissue sensitivities can include pre-existing sensitivity to glycerine, propylene glycol, or flavoring; overexposure to the whitening gel; and ill-fitting trays that irritate the tissue. Patient histories should contain questions about reactions to hand and facial creams, makeup foundations, lipsticks, deodorants, and processed foods, in which glycerin and glycol are commonly found. If a patient has to use non-allergenic cosmetics, that is a strong indicator of a potential reaction to bleaching gels.

Exposed dentin often contributes to hypersensitivity, especially in younger patients. Age-related tissue recession and root dentin exposure do not seem to cause discomfort,⁹ but untreated caries and restorations with open margins can be sites for thermal sensitivity.

Untreated periodontal problems should be resolved, and recent surgery should be allowed to heal, before whitening is begun. Although there are no clinical or empirical data linking carbamide peroxide to complications during pregnancy, prudence dictates total avoidance by pregnant patients.

To minimize tissue irritation, do not disperse more than a seven-day supply of bleaching gel. The patient can pick up an additional week's supply at the office, or it can be mailed. It is imperative that the bleaching schedule be limited to a two-hour application no more than twice a day. Hot and cold beverages should be avoided for at least a half-hour after bleaching.

If any sensitivity occurs, the bleaching time can be reduced; ibuprofen also seems to help. Irritation will usually dissipate within a few days as tissue tolerance increases, and a normal schedule can gradually be resumed.

Prognosis for Bleaching Success

Teeth discolored by aging, smoking, or chromogenic materials such as coffee, tea, and red wine have an excellent prognosis for bleaching. That is why adults make the best candidates—they have had a longer period of exposure to staining—and why bleaching is rarely indicated in younger patients. Children younger than 10 should not use tooth-whitening gels, but there is no upper age limit.

Single dark teeth (without endodontic treatment) lighten almost as well as multiple teeth, although it generally takes longer. Brown discoloration from fluorosis responds well to whitening, but may require some microabrasion. Stained cracks can be bleached successfully, with no evidence of added sensitivity. Brown-orange stains in adults bleach fastest and easiest. Blue-gray stains are more difficult, and white spots will not bleach at all. Moderate-to-dark tetracycline and fever-induced stains cannot be completely removed, but some improvement can be expected.⁹

All areas of a tooth do not whiten at the same rate. The incisal third of the crown is the easiest to bleach, the middle third is a little more difficult, and the cervical third is the most challenging. Non-vital teeth don't respond well to bleaching because their discoloration is not superficial. These teeth will become lighter, but noticeably less so than adjacent teeth; their whiteness will also dissipate more rapidly.

Bleaching is usually done for no longer than three weeks, although it could be extended for months in cases of deep intrinsic staining. No detrimental effects have been found with longer treatment times,⁹ but these patients should probably be referred to their general dentists.

Construction of Bleaching Trays

Essix .5mm Tray-Rite Bleaching Tray Plastic* is inexpensive, FDA-approved, and practically invisible when in place. More impor-

*Trademark of Raintree Essix, Inc., 1069 S. Jeff Davis Parkway, New Orleans, LA 70125.

tant, it is only about .25mm thick when thermoformed, and it compresses when the patient bites down in centric relation. This minimizes any bite-opening effect during retention and ensures efficient dispersion of the bleaching gel.

Blocking out the cast to form reservoirs for the gel is a controversial technique. Whether it allows a more robust oxygenating ionic transfer is debatable.⁹ What is not debatable, however, is that this is a relatively complex and expensive laboratory procedure (Fig. 1). It also hinders close adaptation of the tray at the gingival margin, increasing the potential for gel leakage and consequent irritation of the gingiva.

These disadvantages can be overcome by building a bleaching gel trench into the tray plastic, without any cast modification whatsoever. It takes only a few seconds and serves the same function as blocked-out reservoirs. The thermoformed bleaching trays are so thin and supple that swallowing, or occluding on the tray, causes flexure and thus an even distribution of the gel to the enamel surfaces. The fabrication procedure is as follows:

1. Completely remove all bonding material from the enamel surfaces to be bleached before taking the impression for the working cast.
2. Stretch a rectangular rubber band (about 2mm × 2mm in cross-section) with moderate tension around the cast, centered on the clinical crowns of the teeth (Fig. 2).
3. Spray the cast with Tray-Rite food-grade silicone* to keep the tray plastic from sticking to the cast. Other materials, such as vegetable oil or non-FDA silicone, will tend to discolor the tray material.
4. Heat a .5mm sheet of plastic for 25 seconds. When the material sags slightly and then flattens, it is ready for thermoforming. Excessive heating will alter the qualities of the plastic.
5. Thermoform the plastic over the cast and rubber band (Fig. 3A). Immediately spray the hot plastic with a refrigerant** to bring it to room temperature (Fig. 3B). This provides superior adaptation of the plastic to the cast.
6. Trim the plastic around the necks of the teeth with a Trim Right electric knife* or a heated lab



Fig. 1 Blocking out cast to form reservoirs for bleaching gel is time-consuming, expensive, and unnecessary.



Fig. 2 Rubber band stretched around cast, centered on clinical crowns, to form trench for bleaching gel.

**Chill, GAC International, Inc., 185 Oval Drive, Central Islip, NY 11722.



Fig. 3 A. Tray plastic thermoformed over cast and rubber band. B. Hot plastic sprayed with refrigerant immediately after thermoforming.

knife (Fig. 4). Leave a 1mm space between the plastic and the gingiva to reduce the potential for irritation. For most patients, the tray can be cut at the first premolars. It can be extended distally for unusually wide smiles. Although terminal molars rarely need bleaching, extending the tray does improve retention.

7. Remove the bleaching tray from the cast, and peel out the rubber band. This will leave an obvious trench in the facial surface of the plastic (Fig. 5).

8. If necessary, detail the cervical margins of the tray with a crown-and-bridge scissor or nail clipper.



Fig. 4 Plastic trimmed around necks of teeth with electric knife.



Fig. 5 Bleaching gel trench built into facial surface of plastic.



Fig. 6 Bleaching gel injected into tray.

Bleaching Protocol

The color of the teeth, as indicated by a prosthetic shade guide, should be recorded prior to bleaching to give the patient a means of comparison after the bleaching is finished. In addition, the results are more noticeable if only one arch—usually the upper—is treated at a time. Bleaching of the other arch can begin a week later.

Prophyng the teeth with a rubber cup and a peroxide-containing paste such as Prestige Prophy Paste* will jump-start the bleaching process. This procedure can immediately lighten common yellow-white or brown-orange stains by as much as one shade.

A minor color relapse will be seen right after bleaching as the oxygen trapped in the enamel diffuses out, changing the optical quality. The oxygen saturation appreciably affects bond strength, which is why teeth should not be bonded immediately after bleaching. Bleached teeth will also appear slightly chalky at first, but will return to normal luster in a few days.

Instructions should be given to the patient as follows:

- If possible, brush and floss before wearing the bleaching tray.
- Don't inject a bead of bleaching gel into the bottom of the tray, because at least half will flow to the lingual surface, where it is basically wasted. Excess gel can also cause tissue irritation.
- Place a moderately thin coat of bleaching gel along the facial surface of the tray, adjacent to the teeth to be bleached (Fig. 6), then fill the reservoir trench. (This step can be demonstrated on half the tray, with the patient practicing under supervision on the other half.)
- Use a napkin to wipe off any gel that has extruded onto the soft tissues.
- Wear the tray for two hours no more than twice a day, with at least three hours between applications. Do not wear the tray while sleeping, as it is not sturdy enough to take the place of a retainer.

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Fig. 7 Note difference in shade between bleached maxillary arches and unbleached mandibular arches in three adult patients. (Mandibular arches were bleached later.)

- The peroxide in the bleaching gel is a cleansing agent, but if the tray ever needs to be cleaned, use a cotton swab and soapy water.

Only a one-week supply of bleaching gel should be dispensed at a time, or else the patient will try to accelerate the process and cause undue irritation. Results should be noticeable within 10 days. The working cast should be given to the patient to hold for future use by the general dentist.

Case Reports

These three adult patients were all bleached initially in the maxillary arch (Fig. 7). The bleached teeth were demonstrably lighter within 10 days. Tissue irritation was minimal and did not interfere with the application schedule. The mandibular arches were subsequently bleached without complications and with the same esthetic results.

Conclusion

Bleaching teeth during the retention phase is an added esthetic service for which a reasonable fee is appropriate. Office policies will vary, but the national average fee for this service is \$254 for one arch and \$444 for both arches.⁸

A healthy, attractive smile improves one's self-image and confidence, projecting an aura of health to others. Studies have shown that the appearance of their smiles is increasingly important to people in both their personal and professional lives.¹⁰ It appears that whitening patients' teeth as part of supervised retention is a service that should no longer be overlooked by orthodontists.

REFERENCES

1. Russell, C.M. et al.: Dentist-supervised home bleaching with ten percent carbamide peroxide gel: A six month study, *J. Esth. Dent.* 8:177-182, 1996.
2. Schulte, J.R.; Morrisette, D.B.; Gasior, E.J.; and Czajewski, M.V.: The effects of bleaching application time on the dental pulp, *J. Am. Dent. Assoc.* 125:1330-1335, 1993.
3. Haywood, V.B.; Leonard, R.H.; Nelson, C.F.; and Burnson, W.D.: Effectiveness, side effects and long-term status of night-guard vital bleaching, *J. Am. Dent. Assoc.* 125:1219-1226, 1994.
4. Nathoo, S.A.; Chmielewski, M.B.; and Kirkup, R.E.: Effects of Colgate Platinum Professional Toothwhitening System on microhardness of enamel, dentin, and composite resins, *Compend. Cont. Ed. Dent.* 15(suppl. 17):627-630, 1994.
5. Sterrett, J.; Price, R.B.; and Bankey, T.: Effects of home bleaching on the tissues of the oral cavity, *J. Can. Dent. Assoc.* 61:412-420, 1995.
6. Curtis, J.W. et al.: Assessing the effects of 10 percent carbamide peroxide on oral soft tissues, *J. Am. Dent. Assoc.* 127:1218-1223, 1996.
7. Haywood, V.B.: The Food and Drug Administration and its influence on home bleaching, *Curr. Opin. Cosm. Dent.* 12-18, 1993.
8. Christensen, G.J.: Bleaching teeth: Practitioner trends, *J. Am. Dent. Assoc.* 128(suppl. 5):16-18, 1997.
9. Haywood, V.B.: Night guard vital bleaching: Current concepts and research, *J. Am. Dent. Assoc.* 128(suppl. 5):19-25, 1997.
10. Goldstein, R.E.: Esthetic dentistry—a health service, *J. Dent. Res.* 3:641-642, 1993.