

In-Office Power Bleaching With a Plasma Arc Curing Light



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Throughout dental history, patients have sought dentists who could whiten their teeth. In the early 19th century, tooth whitening meant painting the teeth with ammonia, chlorine, or other caustic materials of questionable

safety and efficacy. Dental bleaching was born in 1864 when Truman was the first to use a calcium hydroxide and acetic acid mixture on teeth.¹ From the early 1900s until recently, dentists were applying hydrogen peroxide to the teeth, which were then exposed to heat and light. This technique necessitated placing a ligated rubber dam and using face protection. The teeth were covered with gauze, soaked in 35% hydrogen peroxide, and exposed to a heat lamp while the liquid peroxide was continually applied. The procedure took 90 minutes for a single arch and required a skilled practitioner and a cooperative patient.

BLEACHING IN THE LATE 20TH CENTURY

In 1989, Haywood and Heymann described the use of a 10% solution of carbamide peroxide as a dentist-prescribed, home-applied bleaching regimen.² Since then, the greatest growth of bleaching products and procedures has been in the at-home bleaching category.

It wasn't until 1993 that in-office bleaching was improved by the introduction of the first bleaching gel that could be activated by a composite curing light. Because the gel was easier to control, a paint-on dam was used, replacing the ligated rubber dam. Bleaching time per arch decreased from 90 minutes to 75 minutes. More important, the material's ease of handling allowed the procedure to be delegated to the dental hygienist.

In-office and at-home bleaching are safe, conservative, and ADA-approved procedures that promote greater treatment participation by hygienists and auxiliaries.

INTRODUCING THE PAC LIGHT

With the introduction of the **Plasma Arc Curing (PAC) Light (American Dental Technologies)**, which reduced the treatment time to 45 minutes for both arches and could be done by the dental hygienist, power bleaching finally came into its own.

In the contemporary dental practice, the incorporation of tooth-whitening procedures brings a wide range of rewards:

- ▶ Happy, referring patients; tooth whitening is the most frequently requested esthetic therapy.
- ▶ Patients who have had their teeth whitened become more receptive to additional therapy to increase the health and appearance of their smile.
- ▶ In-office and at-home bleaching are safe, conservative, and ADA-approved procedures that promote greater treatment participation by hygienists and auxiliaries.

ADVANTAGES OF IN-OFFICE POWER BLEACHING Patient Preference

Although at-home bleaching is effective for dramatic changes in entire dental arches, there are many indications for in-office power bleaching. The most obvious is patient preference. A substantial number of patients interested in tooth whitening will not wear an at-home bleaching tray. In my office, as well as many others, the fee for 2 sessions of power bleaching is the same as the cost of at-home bleaching, and it is my experience that 50% of the patients, when given the choice, choose in-office bleaching. These patients would much rather have the bleaching carried out in two 40-minute appointments with the dental hygienist than wear a bleaching tray every night for weeks. For some patients there is also a perception of safety when the bleach is applied and controlled by a dental professional. Would those patients agree to at-home bleaching if that was the only option offered? Some would, but many would not. It has been my experience that simply adding in-office power bleaching to the available treatment options can increase patient acceptance by as much as 50%.

Often patients request tooth whitening to "brighten up" smiles that have become dingy. For these patients, the 4 or 5 shade changes that can be accomplished with at-home bleaching would be inappropriate and undesirable, as would the fee that accompanies the typical at-home bleaching protocol. Such patients are well served by a single session of power bleaching with 2 or 3 applications of the bleaching gel. This 30-minute hygiene appointment can be charged at an appropriate fee (typically half of the full bleaching fee or less) with gratifying results provided to the patient (Figures 1 and 2).

Increased Control

By eliminating the compliance problems that might occur with at-home bleaching, in-office power bleaching administered by the dental professional offers a higher degree of control. With at-home bleaching, even after the dental provider gives instructions, patients may improperly load the trays or misuse the bleach. This can result in an uneven "stratified" look (Figure 3) or in an unnatural over-bleached appearance. The overuse of at-home bleaching has resulted in composite and porcelain manufacturers producing "bleaching shade guides" with extremes of color more appropriate for bathroom appliances than teeth.

In cases where dentin or cementum is exposed by wear, erosion, or abfraction, at-home bleaching is contraindicated (Figure 4). If the areas are bonded before bleaching, it is impossible to determine the correct final shade and a greater area of enamel will be unavailable to bleach. These



Figure 1—Patient before power bleaching treatment.



Figure 2—The same patient after a single power bleaching appointment.



Figure 3—Improper loading of an at-home whitening tray may result in an uneven "stratified" look.

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cases are amenable to power bleaching because the bleaching gel can be applied selectively to avoid these areas or they can be covered with the paint-on dam (Figure 5) before the application and activation of the bleaching gel (Figure 6).

In addition, to achieve an optimal cosmetic result on many patients, it is necessary to selectively bleach different teeth. Typically the cuspids need more treatment than the centrals and laterals (Figure 7). Power bleaching provides the control of making an unattractive, unevenly colored smile, a uniform cosmetic result (Figure 8).

POWER BLEACH PROTOCOL Before the Bleaching Appointment

1. Examine the areas to be bleached with specific attention to:
 - a. exposed or nearly exposed dentin or cementum.
 - b. loose, possibly leaking restorations or carious areas that require treatment before bleaching.
 - c. tetracycline stains, hypocalcifications, or other localized intrinsic discolorations.
2. Select a starting shade with the teeth moist. Have the patient check the starting shade against the teeth with a mirror and elicit his or her agreement that this is an accurate representation of the initial color. Patients quickly forget how dark their teeth initially were. It is important to discuss the starting shade and the prognosis for improvement. Yellow-brown shades bleach much more effectively and dramatically than gray shades. Explain that the results of tooth whitening vary from patient to patient.

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[®]Goodson M, Shohler L, Imber S, Sam S. Captek alloy reduces dental plaque accumulation. Presented at the International Association of Dental Research General Session; March 11, 1999; Vancouver, Canada.



Figure 4—Exposed dentin is a contraindication to at-home whitening.



Figure 5—Selective application of whitening gel.



Figure 6—Light activation of whitening gel.



Figure 7—Generally, the cuspids need more treatment than the centrals and laterals.



Figure 8—Power bleaching provides the control needed for an esthetic result.



Figure 9—QuasarBrite™ includes one powder tub, two large ampoules, and two small ampoules.

It is important that the patient's expectations be within the range of possible results for a successful procedure. I suggest before-and-after photographs taken with either a 35-mm clinical camera or one of the new digital cameras (**Olympus® 600L, Olympus® America, Inc.**). These photographs are useful for showing the improvement through the tooth-whitening procedure. In our office, the digital photograph is immediately entered into the computer and the possible improvements are previewed using **Viper-soft™ cosmetic imaging software (Integra Medical)**. This is also an excellent opportunity to discuss other cosmetic improvements, such as cosmetic contouring, replacing visible amalgam and gold restorations, or replacing worn and unsightly old prosthetics.

Using PAC Light and QuasarBrite™

1. Explain the procedure to the patient. Inform the patient that after the procedure there may be slight localized bleaching of the gingival margin, which will disappear in a matter of hours. Provide protective eyewear to the patient.

As in all dental procedures, the operator should wear protective eyewear and gloves.

Keep vitamin E capsules in the office. If the whitening gel has bleached the gingival tissue or skin, pierce the capsule and apply a small amount to the affected area. This will alleviate any discomfort and the tissue will regain its natural color in about 30 minutes.

2. Pumice the teeth thoroughly. Use abrasive strips or a prophy-jet device to remove remaining stains and plaque.

3. Isolate the teeth using cheek retractors and cotton rolls. Use a paint-on, light-cured dam, which is provided in the bleaching kit, to cover the free gingival margin extending 4 mm to 5 mm onto the gingival tissue. Use the dam to cover any areas of exposed dentin or cementum. The entire arch application can be cured with a 10-second exposure to the light using a circular motion to cover the entire area. Alternatively, a ligated rubber dam and frame may be used, but this is less comfortable for the patient and a more demanding technique.

4. Acid etching the teeth is optional, but may be beneficial for

more extreme color changes. Use 37% phosphoric acid gel for 15 seconds, rinse thoroughly for 15 seconds, and dry to a frosty appearance.

5. Carefully mix the **QuasarBrite™ (Spectrum Dental, Inc.)** according to the manufacturer's directions (1 powder tub, 2 large ampoules, 2 small ampoules) (Figure 9). To avoid evaporation of the active ingredients, immediately cover the tub of bleaching gel and keep it covered when not in use.

6. Using a disposable brush, plastic instrument, or syringe, place a 2-mm to 3-mm thick layer of bleaching gel on each tooth.

7. With the cone shield properly in place, expose the first tooth in the arch and activate the PAC Light for 10 seconds. Often, two smaller teeth can be exposed to the PAC Light at the same time. Make sure the curing tip remains recessed in the cone shield. If the shield should slip down the curing tip, the teeth will experience excessive exposure, resulting in patient discomfort and sensitivity.

Depressing and holding the foot pedal will activate the PAC Light for a 10-second cycle, after

which it will beep twice and automatically shut off. Proceed to the next tooth and activate the PAC Light for 10 seconds. Continue until each tooth has been exposed to the PAC Light.

8. Using a brush or plastic instrument, stir the bleaching gel already on the teeth. Return to the first tooth treated and repeat the 10-second exposure to each tooth.

Allow sufficient nonexposure (thermal relaxation) time between applications of the PAC Light to any given tooth. This helps ensure that pulpal temperatures remain in a safe range. In an arch of at least six teeth, sufficient time is automatically allowed if one follows the prescribed sequential method. In instances where fewer than six teeth are treated, you must still allow sufficient thermal relaxation time (approximately 60 seconds).

9. Repeat step 8 until the gel on each tooth has been activated by the PAC Light for a total of 30 seconds.

10. Allow the whitening gel to remain on the teeth for approximately 3 minutes longer. This allows the dissociation of oxygen for better enamel matrix penetra-



Figure 10—Patient's smile before power bleaching treatment.

Figure 11—Same patient after power bleaching treatment, comparing the results to the starting shade button.



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tion and increased lightening effect. If both arches are to be done simultaneously, this is an excellent time to apply and activate the whitening gel on the opposing arch.

11. When the oxidation process is complete, use a damp 2-inch x 2-inch gauze and suction to carefully remove the gel. Rinse thoroughly, directing the water away from the gingival protection barriers to avoid dislodging them. Pumice the teeth to remove the remaining oxidized bleaching gel and provide a clean surface for the next application. Rinse carefully. Note the shade change and determine if further bleaching is required. Usually a 1 to 1½ shade change is evident, but this may be misleading because the teeth are desiccated and will darken slightly as they rehydrate.

12. Repeat steps 6 through 11 until the desired whitening is achieved. For the patient's comfort, 4 to 6 applications are usually the maximum possible at one visit. If further whitening is desired, a second appointment is scheduled.

13. After washing off the last application of bleaching gel, remove the gingival protection and cheek retractors, and permit the patient to rinse. Allow the patient to close his or her mouth as often as possible to keep the teeth wet. This will hasten rehydration and provide a more accurate final shade. Finish the teeth by restoring their natural luster as you would finish composite restorations, using your favorite brand finishing disks, cups, and paste.

To increase the patient's comfort, apply aloe vera gel or vitamin E to the gingival tissues and lips. For patients who have experi-

enced sensitivity during the procedure, the application of neutral sodium fluoride gel in the office and twice a day for the first week is of great benefit. This can be applied with a cotton swab or, if at-home bleaching trays have been made for additional bleaching, in these trays.

Posttreatment

Compare the results to the starting shade button and decide with the patient whether further bleaching is necessary (Figures 10 and 11). Keep in mind that although the teeth have had some time to rehydrate, a slight additional darkening may occur over the next hour. If the patient is happy with the color achieved by the bleaching, it is a great time to review other factors affecting their cosmetic appearance. The benefits of whiter teeth go a long way in motivating further improvements. Using an instant digital photograph or an intraoral camera to freeze the smile allows you and the patient to focus on specific problems and develop a treatment plan.

Review the home care instructions that are copied and given to the patient:

For 2 weeks after the bleaching procedure:

- ▶ Avoid coffee, tea, cola, red wine, and other colored beverages that may stain the newly bleached teeth. If total avoidance is impossible, drinking through a straw will help protect the teeth.
- ▶ Avoid smoking as much as possible immediately after bleaching.
- ▶ Avoid acidic liquids such as citrus juices or athletic drinks which may increase the sensitivity of the teeth.
- ▶ If the teeth become sensitive, apply neutral sodium fluoride as directed by our office.

Comparing Heat Sources

QuasarBrite™ bleaching gel, as well as other bleaching systems, is activated by thermal energy. It is a heat-accelerated redox reaction in which hydrogen peroxide is reduced, releasing the free

radical perhydroxyl ions, which oxidize the stains and thereby bleach the teeth.³

The basic idea is to increase the temperature of the bleaching gel, and to some extent the enamel surface, without substantially increasing the pulpal temperature. Studies have shown that the PAC high-intensity curing light achieves greater surface temperatures than standard curing lights in much less time.⁴ Standard curing lights not only take longer to reach a lower temperature, but also increase the pulpal temperature for a longer period.⁵

In our cosmetic conscious society it is obvious that the successful practice must incorporate esthetic procedures such as tooth whitening

The additional time required by conventional curing lights also makes bleaching one arch an inordinately long procedure and two arches impossible. Compare the procedure for eight teeth in one arch:

Conventional Curing Light:
8 teeth × 40 seconds × 3 cures
= 960 seconds or 16 minutes
per application
If 4 applications are done in
one visit = 64 minutes.

PAC Light:
8 teeth × 10 seconds × 3 cures
= 240 seconds or 4 minutes
per application
If 4 applications are done in
one visit = 16 minutes

If you add 15 minutes to seat and prepare the patient, apply the isolation, rinsing, and post-bleach polishing, one arch will take 75 minutes with a conventional curing light. The use of the PAC Light per-

mits power bleaching to be accomplished on both upper and lower arches in a 45-minute appointment.

The physical properties and protocol for power bleaching with an argon laser are the same as the PAC Light, but in most states, dental hygienists and assistants are not permitted under the dental practice acts to use a laser in patient treatment. Power bleaching is financially rewarding only if carried out by the dental auxiliary. In addition, the power and safety requirements, which are absolutely necessary when using the laser, militate against its use in bleaching.

COST CONSIDERATIONS

In the world of private practice it is often necessary to evaluate a new technology or procedure and determine if it can be economically incorporated, especially when it involves the purchase of capital equipment.

If the practice is fortunate enough to already have a PAC Light, the addition of power bleaching as a substantial growth and profit center is as easy as putting out the counter-card and patient brochures available free from the manufacturers of power bleaching materials.

For the dentist evaluating the benefits of adding a PAC Light to the practice, simple analysis will show that two 45-minute appointments administered by the dental hygienist or auxiliary at an average of \$600 to \$900 provides a substantial return on investment. When you add to that the advantages of a PAC Light in composite dentistry, such as time savings and significantly more thorough curing with less pulpal heat transfer,⁶ the choice to invest in the PAC Light becomes an easy one.

SUMMARY

In our cosmetic conscious society it is obvious that the successful practice must incorporate esthetic procedures such as tooth whitening. Perhaps not as obviously, power bleaching also provides a clear difference from the gels and trays offered by infomercial hucksters and magazine

advertorials. As I write this, an ad from a national magazine sits on my desk with the headline: "The kit is identical to one my friend paid a dentist \$600 for and actually works faster." The ad goes on to show a kit with user-moldable trays and six syringes of 16% carbamide peroxide—all for \$79.95. Of course there is no professional supervision, but that hardly explains the \$520.05 difference to the patient!

In-office power bleaching with a PAC Light, by providing a choice and far greater control, substantially increases the number of patients who will avail themselves of the excellent benefits of cosmetic bleaching. ■

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Product References

- | | |
|----------------------|--------------------------------------------------------|
| Product: | Plasma Arc Curing (PAC) Light |
| Manufacturer: | American Dental Technologies |
| Address: | 8411 Northwestern Highway
Southfield, MI 48034-5541 |
| Phone: | 800.359.1959 |
| Fax: | 810.353.0663 |
| Product: | Olympus® 600L |
| Manufacturer: | Olympus® America, Inc. |
| Address: | Two Corporate Center Dr.
Melville, NY 11747-3157 |
| Phone: | 516.844.5000 |
| Fax: | 516.844.5264 |
| Product: | Vipersoft™ software |
| Manufacturer: | Integra Medical |
| Address: | 1330 Flynn Rd.
Suite A
Camarillo, CA 93012 |
| Phone: | 805.388.7030 |
| Fax: | 805.987.4552 |
| Product: | QuasarBrite™ |
| Manufacturer: | Spectrum Dental, Inc. |
| Address: | 8554 Hayden Pl.
Culver City, CA 90232 |
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