

A Handheld Broadband UV Phototherapy Module for the Treatment of Patients With Psoriasis and Vitiligo

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Short pulses of UV light in the 300- to 380-nm wavelength have been proven to effectively treat dermatoses, such as psoriasis and vitiligo. Lasers with handheld phototherapy modules that can direct UV light to more specific treatment areas may offer patients and clinicians a highly effective alternative treatment to full-body lightbox UV phototherapy as a standard therapy or to complement topical, injectable, or oral therapies for the treatment of psoriasis and vitiligo.

Lasers that emit short pulses of UV light in the 300- to 380-nm wavelength have been proven effective for the treatment of dermatoses, such as psoriasis and vitiligo.¹⁻⁸ Laser platforms with handheld broadband UV phototherapy modules may offer a new and highly effective alternative treatment to full-body lightbox UV phototherapy as a standard therapy or to complement topical, injectable, or oral therapies for the treatment of psoriasis and vitiligo.

Successful clinical outcomes have been reported treating patients with even the most difficult psoriasis and vitiligo with targeted UV phototherapy using the Harmony XL handheld broadband UV phototherapy module (Alma Lasers, Inc, Buffalo Grove, Illinois).⁹ The multiuse platform with handheld broadband UV module uses high-power spectral irradiance in the UVB and UVA1 wavelengths with a highly targeted and localized

light beam that allows us to treat both large and small areas without exposing healthy surrounding skin to unnecessary radiation. This article discusses the authors' experience with a particular laser platform and handheld broadband UV phototherapy module (Harmony XL) in the treatment of patients with psoriasis and vitiligo (Figures 1-6).

LIMITATIONS OF OTHER TREATMENT MODALITIES

Before targeted laser technology, clinicians had to treat psoriasis and vitiligo with full-body exposure of UVB (Goeckerman regimen) or psoralen plus UVA (PUVA) therapy, which typically required several months of treatment up to 3 times per week. With these treatments it was not possible to focus on isolated skin areas, so healthy skin also was affected. While clinical results were acceptable, the wavelength used in PUVA therapy is very wide, which increases the risk of developing melanoma, especially for patients with vitiligo who require numerous treatment sessions.

One of the first laser technologies brought into practice was the excimer laser. Using lasers enabled us to focus high-intensity UV light on isolated and more resistant areas of affected skin as well as perform whole body treatments with UV lightboxes. But these laser units were extremely large, required a dedicated treatment

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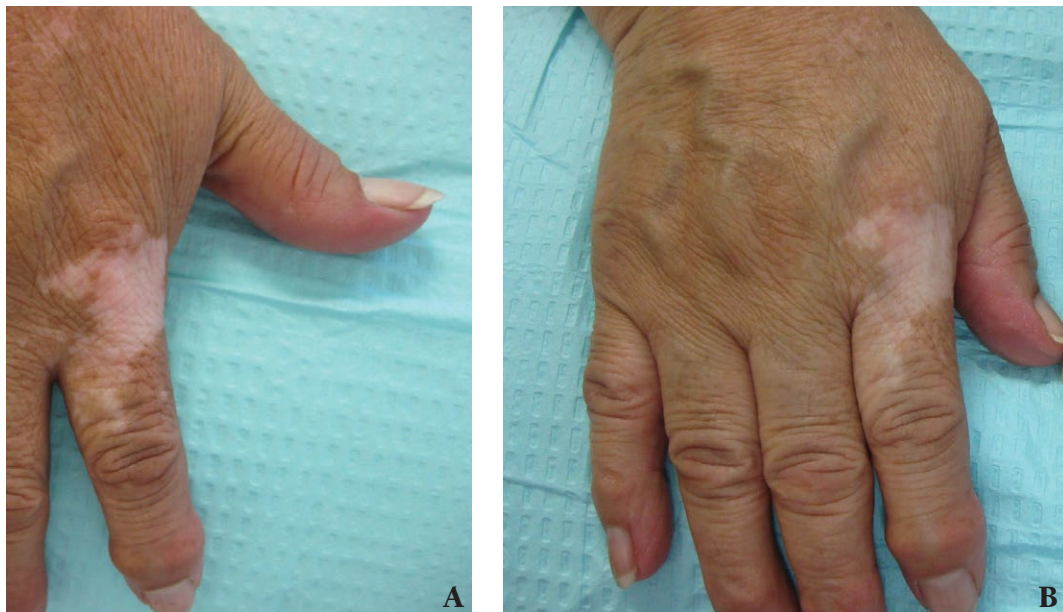


Figure 1. The right hand of a patient with vitiligo before (A) and during (B) treatment with UVB phototherapy.



Figure 2. The left hand of a patient with vitiligo before (A) and during (B) treatment with UVB phototherapy.

room, and were expensive to use. The Harmony XL is one laser platform with a modular design, which consists of a base unit and an assortment of handheld modules that attach interchangeably for a variety of different clinical and aesthetic applications.

The handheld broadband UV module is indicated for treatment of psoriasis, leukoderma such as vitiligo (acquired leukoderma), atopic dermatitis (eczema), seborrheic dermatitis, hypopigmented skin presenting as striae distensae (stretch marks), postsurgical scars, traumatic scars, acne scars, grafted skin, burn scars, laser skin resurfacing, and chemically peeled

skin. The handheld broadband UV module can be used with all Fitzpatrick skin types, including tanned skin.

Treatment parameters for any skin condition are predicated on the type of lesion, patient skin type (based on Fitzpatrick skin types I–VI gradation), size of the skin area with lesions or spots, and depth and density of psoriatic lesions. If a patient has extensively large areas of affected skin, or lesions or spots widely scattered over the body, treatment often is initiated with UV lightbox for the whole body. As treatment progresses, additional therapy sessions with the handheld module can be added into the treatment program to



Figure 3. The left hand of a patient with vitiligo before (A) and during (B) treatment with UVB phototherapy.

address isolated tough areas. If the problem areas are localized to begin with, treatment can begin immediately with the handheld broadband UV module of the laser system.

LASER TECHNIQUES

Treatment of Psoriasis Using the Handheld Broadband UV Module

To effectively treat psoriasis, UV light fluence must be sufficiently high to cause visible erythema (pink or light red coloration similar in appearance to a mild sunburn) but not so high as to induce symptoms associated with more severe sunburn, such as blistering and erosion.^{1,2} The erythema also must be localized to the affected area with no adverse side effects to the healthy surrounding skin.

Therefore, when using lasers to treat patients with psoriasis, it is critical to determine the correct initial fluence level before beginning any therapeutic treatment regimen. Skin reactions vary substantially from patient to patient, even in patients with the same Fitzpatrick skin type. The first step should be to perform a minimal erythema dose (MED) test to determine the lowest dose of UV light that triggers a discernable erythema reaction.

The MED test must be performed at least 1 to 2 days prior to the anticipated commencement of UV treatment. When performing an MED test, an uninvolved section of healthy, untanned skin, such as the lower back or upper buttocks should be used. The skin must be cleaned thoroughly to remove any perfume, body lotion, or soap residue. The handheld broadband UV module can be

used directly on the skin and does not require the application of a gel or photosensitizing agent.

For the MED test, the authors expose a series of individual test spots at different levels of fluence using the handheld broadband UV module (Harmony XL). Six to 10 different small sections of skin are exposed using increasingly higher doses, or fluence level settings, at each test spot. The fluence level is gradually increased by a variance of 100 mJ to 200 mJ at each successive test spot.

The starting point the MED test, or lowest test fluence level to be tested, is determined by Fitzpatrick skin type. For example, when treating patients with Fitzpatrick skin types I and II, the authors expose the first test spot with a UV beam set to a light density of 2000 mJ/cm², the second test spot would be exposed at 2100 or 2200 mJ/cm², and so on. For patients with Fitzpatrick skin types III to IV the initial fluence level used is 2200 mJ/cm², and for patients with Fitzpatrick skin types V and VI the initial fluence level used is 2400 mJ/cm².

After 24 to 48 hours, the skin test results are evaluated to identify the lowest dosed test spot that exhibits a clearly delineated and uniform pink or slightly red skin coloration, which determines the MED necessary to begin treatment.

During the first therapeutic treatment, the fluence level should be set at approximately 70% to 90% of the predetermined MED. This allows clinicians to set a baseline and to ensure that affected skin areas respond in the same way as the test skin with no adverse side effects.



Figure 4. The right hand of a patient with vitiligo before (A) and after (B) 6 treatment sessions with UVB phototherapy.

Treatment of affected skin in patients with psoriasis should overlap the healthy skin at the periphery of the treated site by no more than one or 2 millimeters. With the broadband UV hand piece module for use with the Harmony XL platform, precision adjustments can be made in fluence between 200 to 1000 mJ/cm² in 10 mJ/cm² increments, and set the pulse duration for 30, 40, or 50 milliseconds. The light beam can pinpoint a treatment area (spot size) as small as 6.4 cm². If a smaller treatment area is required, several round and square templates are available to reduce the treatment area.

Within 24 hours after each treatment, slight erythema is the desired outcome. It is the author's experience

that as long as we continue to achieve the desired outcome, we can increase the fluence setting incrementally by 10% to 20% for each subsequent treatment, as long as there are no adverse side effects. We typically administer 2 treatments per week for the first 2 weeks of the therapy program.

Based on how well and how quickly the patient responds to treatment, we may keep the same treatment schedule, or drop down to one treatment per week or once every other week until full resolution of psoriasis lesions occurs. No additional treatments are needed during remission in the author's practice. For patients with psoriasis the longest treatment period has been 9 months but the average is 3 months. In the rare



Figure 5. The left leg of a patient with psoriasis before (A) and after (B) treatment with UVB phototherapy.



Figure 6. The right hand of a patient with vitiligo before treatment (A), after 6 treatments (B), and after 12 treatments (C) with UVB phototherapy.

occasion where prominent adverse reactions or side effects appear, we simply reduce the dose or delay the subsequent treatment until the symptoms resolve.

Treatment of Vitiligo Using the Handheld Broadband UV Module

The approach for treating vitiligo with the broadband UV handpiece module for use with the Harmony XL laser platform is very similar to the process for psoriasis. One difference is that the starting MED and incremental increases in fluence level are determined by Fitzpatrick skin type, the location of the spots on the body, and response to treatments in skin of each patient.

For face, scalp, periocular, ear, neck, axilia, bikini line, and large areas like arms, legs, and trunk, we typically start treatment with light fluence set at 2000 mJ/cm². For skin on joint areas, such as wrists, elbows, and knees, we use a setting of 2200 mJ/cm² for the initial treatment. For more difficult areas, such as hands, feet, fingers, and toes, the indicated starting fluence level is generally between 2300 mJ/cm² and 2500 mJ/cm².

As with treatment for psoriasis, the desired outcome for the treatment of vitiligo is slight erythema. As long as the desired outcome is achieved, the dose at each subsequent treatment can be increased between 5% and 25% depending on Fitzpatrick skin type and which area of the body is being treated. If the erythema resulting from a treatment lasts longer than 48 hours, the fluence is decreased for the next treatment by 5% to 20%, again depending on which area of the body is being treated.

The average program for the treatment of patients with vitiligo consists of 2 treatment sessions per week for 6 to 10 weeks. This range may vary, however, depending on the patient's response, the rate of

improvement, and the extent of improvement that would be considered a successful clinical outcome. Areas that respond well to treatment, such as the face and neck, may require fewer treatments.

PRACTICE CONSIDERATIONS

One of the key features of the handheld broadband UV module is the speed and precision with which it can deliver high dosages of UV light. Higher Fitzpatrick skin types are more tolerant to treatment with broadband UV light, so some patients require much higher dosage levels than others as treatment progresses.^{2,10} Also, treatment results for some patients may simply peak at the 3800 mJ/cm² fluence level. The handheld broadband UV module allows clinicians to “double stack,” or effectively double the dosage for application (eg, treating affected areas with 2 doses of 2500 mJ/cm² for a total of 5000 mJ/cm² if necessary). In the author's experience it also delivers this high dose in approximately half the time it takes excimer lasers, which substantially reduces the amount of time a patient is exposed to high levels of UV light.

There are other advantages to modular systems, including the handheld broadband UV module, because they do not require parts replacement after each use, resulting in no consumables. In the author's experience, the handheld broadband UV module for use with the Harmony XL laser platform is straightforward to use so trained and licensed staff technicians can administer routine UV treatments, freeing clinicians to focus on treating new patients, diagnosing patients, and performing more complex clinical procedures.

An important practice consideration is that billers utilize the appropriate Current Procedural Terminology coding and guidelines for targeted phototherapy treatments to successfully receive insurance reimbursement

when treating patients with psoriasis and vitiligo. Reimbursement of treatments performed with the Harmony XL in the author's experience has been equivalent to that of treatment with other excimer platforms.

CONCLUSION

One of the most important treatment goals of most patients with psoriasis or vitiligo is simply not to look different in public. Seeing tangible results of a positive clinical outcome earlier in the treatment process after treatment with UV phototherapy gives them hope for complete improvement. Overall, patients respond very well to laser treatments for psoriasis and vitiligo, with a marked increase in treatment satisfaction. Most patients find the treatments with the handheld broadband UV module are painless, individual treatment sessions take less time, and clinical outcomes are accelerated compared to conventional phototherapy platforms, ultimately increasing satisfaction.

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