A review of targeted ultraviolet B phototherapy for psoriasis

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Targeted ultraviolet (UV) B phototherapy devices provide a practical means to treat localized psoriasis while sparing harmful effects to unaffected skin. The objective of this study was to characterize the efficacy and safety of targeted phototherapy devices for psoriasis. We conducted a PubMed search for broadband UVB, narrowband UVB, and localized phototherapy, and a Google search for handheld phototherapy. The most common targeted phototherapy devices were characterized as 308-nm excimer laser, 308-nm excimer nonlaser, or nonexcimer light subtypes. Nine clinical trials met inclusion criteria and all found targeted phototherapy efficacious. In a nonexcimer light study, high doses cleared the most plaques. The 308-nm excimer laser had long-term clearance in 13 of 26 patients. The mean number of UVB treatments in all 9 studies and highest cumulative dose was less than those same parameters in nontargeted phototherapies. Common adverse effects included erythema, blisters, hyperpigmentation, erosion, mild burning, and itching. The predominant setting for excimer units is the office; however, the majority of nonexcimer light devices can also be used at home. Targeted phototherapy should be considered among the treatment options for localized variants of psoriasis. (J Am Acad Dermatol 2012;66:664-72.)

Key words: cost; efficacy; equipment; excimer; localized psoriasis; mechanism.

Ultraviolet (UV) therapies—including psoralen plus UVA, broadband UVB, and narrowband UVB (NBUVB)—are effective for psoriasis by inhibiting cutaneous immune function. However, there are chronic (photoaging, skin cancer) and acute (sunburn, erythema) local toxic effects associated with UV irradiation.[1] Although UV phototherapies are beneficial for patients with extensive psoriasis, there are limitations when the light is not targeted to the psoriasis plaques. The major limitations include the high number of treatments—ranging from 25 to 30—to clear lesions, and the relative intolerance of the uninvolved skin to UV exposure.[2,3]

The development of handheld phototherapy technologies facilitate the targeting of UV light to psoriasis lesions. In addition to sparing exposure of uninvolved skin, targeted phototherapies can use higher doses of UV light and therefore improve psoriasis in fewer treatments than are required with nontargeted phototherapy.[4-6] Localized phototherapy treatment yields a high level of patient satisfaction.[7] Provided the relative convenience of handheld UVB devices, familiarity with this treatment is beneficial for general dermatologists and physicians who treat mild to moderate psoriasis. The purpose of this review is to describe the rationale of targeted phototherapy in localized psoriasis management and to provide an overview regarding its costs, efficacy, convenience, and safety.

Abbreviations used:

MED:	minimal erythema dose
MEL:	monochromatic excimer nonlaser
NBUVB:	narrowband ultraviolet B
PASI:	Psoriasis Area and Severity Index
UV:	ultraviolet

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METHODS

A review of the literature on localized phototherapy, broadband UVB, and NBUVB phototherapy was conducted using PubMed. The following search terms were used: "phototherapy," "targeted phototherapy," "localized phototherapy," and "psoriasis phototherapy." We assessed the efficacy, safety, costs, and convenience of localized phototherapy compared with nontargeted forms of UV phototherapy. Inclusion criteria consisted of treatment cohorts greater than 7 patients and adequate descriptions of administered dosage, number of treatments, cumulative dosage, improvement, and follow-up. Case reports and reviews were excluded. In addition, a Google search for localized phototherapy equipment and technology was undertaken to acquire additional reported information regarding specifications, safety, and efficacy of targeted phototherapy units.

CAPSULE SUMMARY

- Targeted ultraviolet B phototherapy devices provide a practical means to treat localized psoriasis while sparing harmful effects to unaffected skin.
- This review analyzes the efficacy and safety of the 308-nm excimer laser, 308-nm excimer nonlaser, and nonexcimer targeted phototherapy devices for psoriasis as demonstrated in clinical trials.
- Targeted handheld phototherapy is an effective, safe, and convenient treatment modality that should be considered as an option for localized variants of psoriasis.

RESULTS

A total of 42 studies were identified: 35 for the excimer laser, 4 for the excimer light, and 3 for the nonexcimer subtypes. Three excimer laser, 3 excimer nonlaser, and 3 nonexcimer studies satisfied the inclusion criteria.

Localized UVB phototherapy

Localized UV treatment options. Numerous modalities can be used to deliver UVB targeted to skin lesions (Table I). The most common and extensively implemented mode of delivery is the 308-nm excimer laser. Excimer stands for excited dimer, a diatomic molecule usually of an inert gas atom and a halide atom, which are bound in excited states only. These diatomic molecules have extremely short lifetimes and dissociate releasing the excitation energy through UV photons. Two excimer lasers are approved by the US Food and Drug Administration for treatment of mild to moderate localized psoriasis. Both of these devices are xenon-chloride gas excimer lasers that deliver coherent, monochromatic UVB light of 308-nm wavelength in short impulses and allow for changes in important phototherapeutic parameters such as impulse frequency and light intensity. In addition to the treatment of psoriasis, excimer lasers can be used for treating vitiligo, atopic dermatitis, and leukoderma.

Although laser treatment is the dominant standard of 308-nm excimer delivery in the United States, numerous studies in European countries have reported the use of a 308-nm monochromatic excimer nonlaser (MEL) light source (Table I).[8-10] Three popular models are in use. One device has a power of 50 mW/cm^2 at a distance of 15 cm from the source, making it useful for medium to large psoriatic plauqes.[8] Other cited advantages of this excimer lamp over laser-based systems are its absence of potentially toxic gas cylinders, shorter application times, and the need of only one session per week.[8,10] In light of these benefits, future studies should be undertaken to directly compare the efficacy of the excimer lamp with the laser system.

Nonexcimer handheld modalities can also be used to deliver localized UVB (Table I). These devices deliver NBUVB and are approved for the treatment of psoriasis or vitiligo. Portable and lightweight, these devices are useful for the treatment of scalp or spot psoriasis. One unit uses a liquid medium in a flexible cable delivered to a cylindrical pencil-grip-style handpiece and can deliver both UVA and UVB doses. Another unit, which targets small spot and scalp lesions, uses two bulbs, enabling the device to irradiate a larger treatment area. Similar to the 308-nm excimer systems, these NBUVB handheld devices have the added benefit of limiting skin exposure to UV light, as compared with full-body irradiance in a booth or by a panel of fluorescent lamps.[11] Future long-term reports should compare the application and protocols of these nonexcimer devices with those of excimer lasers.

Clinical efficacy studies. Several studies have assessed the therapeutic efficacy of localized phototherapies (Table II). Efficacy can be assessed with respect to fluency, clearance, remission times, and number of treatments. The majority of localized phototherapy studies examine the use of the 308-nm excimer laser, but there are several reports on the 308-nm excimer nonlaser and nonexcimer