Cigna Medical Coverage Policy

Subject **Phototherapy, Photochemotherapy, and Excimer Laser Therapy for Dermatologic Conditions**

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Coverage Policy

Coverage for home phototherapy devices is subject to the terms, conditions and limitations of the applicable benefit plan's Durable Medical Equipment (DME) benefit and schedule of copayments. In addition, some types of home phototherapy devices, such as ultraviolet cabinets (HCPCS code E0694), are specifically excluded under many benefit plans. Please refer to the applicable benefit plan document to determine benefit availability and the terms, conditions and limitations of coverage. Under many benefit plans, coverage for DME is limited to the lowest-cost alternative.

Coverage for the treatment of vitiligo is dependent on benefit plan language, may be subject to the provisions of a cosmetic exclusion and/or reconstructive surgery benefit, and may be governed by state mandates. Please refer to the applicable benefit plan language to determine benefit availability and the terms, conditions and limitations of coverage.

Office-Based Phototherapy, Photochemotherapy and Excimer Laser Therapy

Cigna covers office-based phototherapy and photochemotherapy* as medically necessary when there is failure, intolerance or contraindication to conventional medical management (e.g., diet restrictions, topical ointments or creams, immunosuppresants) for ANY of the following dermatologic conditions:

- atopic dermatitis (i.e., atopic eczema)
- connective tissue diseases involving the skin (e.g., cutaneous graft vs. host disease [GVHD], localized scleroderma, lupus erythematosus)
- cutaneous T-cell lymphoma (CTCL) (e.g., mycosis fungoides)
- lichen planus

- photodermatoses (e.g., polymorphic light eruption, actinic prurigo, chronic actinic dermatitis)
- psoriasis

[*]Office-based phototherapy includes actinotherapy, type A ultraviolet (UVA) radiation; type B ultraviolet (UVB) radiation; and combination UVA/UVB radiation. Photochemotherapy includes psoralens (P) and type A ultraviolet (UVA) radiation, known as PUVA photochemotherapy and combinations of P/UVA/UVB.

Cigna covers targeted excimer laser therapy (i.e., 308 nanometers [nm]) as medically necessary for the treatment of localized, plaque psoriasis refractory to conservative treatment with topical agents and/or phototherapy.

Home Phototherapy Devices

If coverage for home phototherapy devices is available, the following conditions of coverage apply: Cigna covers an appropriately sized (e.g. hand wand for hand, two-foot panel for lower leg) ultraviolet B (UVB) home phototherapy device as medically necessary when the above criteria for office-based phototherapy and photochemotherapy are met with ALL of the following:**

- outpatient UVB phototherapy has been utilized, demonstrated to be beneficial and is expected to be long-term
- the device is not available without a prescription and the device and treatment regimen are prescribed by a physician
- individual is motivated and compliant to prescribed usage

****Ultraviolet cabinets are generally not covered**

Not Covered

Cigna does not cover phototherapy, photochemotherapy or excimer laser therapy for the treatment of EITHER of the following in any setting because such treatment is considered cosmetic and not medically necessary. Services that are cosmetic are not covered under most benefit plans.

- alopecia areata
- localized or generalized vitiligo

Cigna does not cover phototherapy or photochemotherapy in any setting for any other dermatologic condition because it is considered experimental, investigational, or unproven.

Cigna does not cover targeted excimer laser therapy (i.e., 308 nanometers [nm]) for any other dermatologic condition, including the treatment of ANY of the following, because it is considered experimental, investigational or unproven (this list may not be all-inclusive):

- atopic dermatitis (i.e., atopic eczema)
- lichen planus
- onychomycosis

Cigna does not cover ultraviolet A (UVA) phototherapy in the home setting because it is considered not medically necessary.

Cigna does not cover the use of a tanning bed/unit for any reason in any setting because it is not considered medical in nature and as such does not meet the standard plan definition of Durable Medical Equipment. In addition, Cigna does not cover the use of a tanning bed/unit in any setting, including the home, for the treatment of dermatologic conditions because it is considered not medically necessary.

General Background

Phototherapy (e.g., actinotherapy) is defined as exposure to non-ionizing, ultraviolet (UV) radiation for therapeutic benefit by inducing DNA damage. The therapy involves exposure to type A ultraviolet (UVA) radiation or type B ultraviolet (UVB) radiation or various combinations of UVA and UVB. The differences in these ultraviolet light forms are the length of the waves. UVA wavelength is 320-400 nanometers [nm], broadband (bb) UVB is 280–320 nm and narrowband (nb) UVB is 311–312 nm. UVA is further broken down into UVA1 (340–400nm) and UVA2 (320–340nm). The longer wavelengths emit a lower energy level. UVA bulbs, for example, are used in tanning beds for cosmetic effects because they promote tanning using lower energy with less erythema than UVB. Photochemotherapy is exposure to UVA radiation following administration of a psoralen (e.g., methoxsalen, trioxsalen) given orally, topically, or in a bath. Combination therapy includes phototherapy or photochemotherapy with topical agents, such as tar, anthralin and corticosteroids, or with systemic agents, such as retinoids and methotrexate. The duration and number of treatments depends on the dermatologic condition; type, number, and location of the lesions; skin type; type of therapy (e.g., UVA, UVB, PUVA); and the dosage. Treatments may be given 2–5 times per week for several weeks and may involve up to 40 treatments depending on the response of the condition to the therapy.

Excimer laser, also called exciplex laser, is a form of ultraviolet laser proposed for the treatment of various dermatologic conditions including, atopic dermatitis, psoriasis and vitiligo. An excimer laser releases a spectrum of 308-nm UVB wavelengths and is used to treat small, focused areas of the body (e.g., 2 X 2 centimeters). Laser therapy is proposed to increase the precision and delivery of UVB energy to targeted tissue. The increased precision results in a faster therapeutic effect and decreases the total number of treatments needed, limits the amount of UV radiation exposure, and decreases the risk of skin cancer. However, this precision makes total-body treatment with laser therapy difficult. Some propose that laser therapy is effective, safe and well tolerated when limited to less than 20% of the body surface. Treatments are typically given two to three times a week on nonconsecutive days for 4–36 weeks (Groysman and Sami, 2010; Nicolaidou, et al., 2009).

U.S. Food and Drug Administration (FDA)
Phototherapy and photochemotherapy light sources are approved by the FDA 510(k) process as Class II phototherapy units. Examples of phototherapy light sources include: VersaClear™ Skin Therapy System (TheraLight, Inc., Carlsbad, CA) and the Houva Phototherapy System with PhotoSense II™ (National Biological Corporation, Inc., Beachwood, OH). They are approved for the treatment of various skin disorders.

XeCl excimer lasers are also approved by the FDA 510(k) process. Not all lasers are approved for the treatment of the same dermatological conditions. The FENCER Excimer Laser System (Kera Harvest/Laser Max Medical Technologies Corporation, Visalia, CA) and the XTRAC XL Excimer Laser System (PhotoMedex, Inc. Carlsbad, CA) are approved for the treatment of psoriasis, vitiligo, leukoderma, and atopic dermatitis. The 308 Dermatological Excimer Lamp Phototherapy system (Quantel Medical, Hasbrouck Heights, NJ), distributed by National Biological Corporation, is approved for the treatment of psoriasis and vitiligo. The Excilite™ and Excilite-µ (Cynosure, Inc., Chelmsford, MA) monochromatic excimer light systems are approved for the treatment of "leukoderma, psoriasis, vitiligo, eczema, and seborrheic dermatitis, for skin types I to VI". The Levia Phototherapy System (Lerner Medical devices, Inc., Los Angeles, CA) is "intended for use in UVB phototherapy in all skin types for the treatment of psoriasis including scalp psoriasis, vitiligo, atopic dermatitis (eczema) seborrheic dermatitis and leucoderma". The Levia has a fiber-optic brush used for areas of the skin covered with hair (FDA, 2008; FDA, 2007; FDA, 2005; FDA, 2004).

Indications for Phototherapy, Photochemotherapy and Excimer Laser Therapy
Evidence in the published peer-reviewed scientific literature, including randomized controlled trials and case series, as well as professional societies and organizations support the safety and effectiveness of phototherapy and photochemotherapy for the treatment of atopic dermatitis, connected tissue diseases involving the skin, cutaneous T-cell lymphoma, lichen planus, photodermatoses, and psoriasis for patients who do not tolerate or are unresponsive to conventional medical management (e.g., diet restrictions, stress control, oral immunosuppressive agents, biologic agents, topical and oral steroids). Excimer laser therapy is supported by the evidence in the literature and is an established treatment option for patients with psoriasis that is unresponsive to topical agents or phototherapy.

The treatment of vitiligo is aimed at repigmentation and improved cosmesis and not medically indicated. Likewise, because the treatment for alopecia areata is to restore hair loss and improve cosmesis, it is not medically indicated. Phototherapy, photochemotherapy and excimer laser therapy are proposed for the

treatment of numerous other dermatologic conditions. However, there is insufficient evidence in the peer-reviewed literature to support the efficacy of these therapies for the treatment of other conditions.

Atopic Dermatitis (Atopic Eczema)
Atopic dermatitis, or atopic eczema, is a chronic skin condition characterized by a dry, itchy rash on the face, elbows, hands, knees, and/or feet. In addition to skin care and avoidance of substances that might irritate the skin, topical ointments and creams, and oral corticosteroid are standard treatment options. For severe cases in adults, immunosuppressants may be prescribed. If unresponsive to medication, phototherapy and photochemotherapy (i.e., UVA, UVB and PUVA) are established treatment alternatives (Brown and Reynolds, 2006; Wise, 2006). Evidence to support excimer laser therapy for the treatment of atopic dermatitis is lacking.

Literature Review: The evidence in the published peer-reviewed scientific literature in the form of systematic reviews and randomized controlled trials supports UVB, nbUVB, and UVA phototherapy, PUVA, and combination treatments as safe, effective, and well-tolerated therapies for atopic dermatitis. Studies reported appreciative improvement in symptoms and in some cases long-term remission (Tzaneva, et al., 2010; Meduri, et al., 2007).

There are a limited number of studies evaluating laser therapy for the treatment of atopic dermatitis. Studies are primarily in the form of case series or retrospective reviews with small patient populations and short-term follow-ups. Brenninkmeijer et al. (2010) conducted a within patient, randomized controlled trial (n=10) to compare the safety and efficacy of 0.05% topical clobetasol propionate (CP) ointment to excimer laser (EL) therapy for the treatment of prurigo atopic dermatitis. The patients had more than four symmetrical prurigo nodules on the lower and upper extremities that had persisted for six months or longer. Treatment was randomized to either the right or left side of the patient's body. Laser therapy was administered for ten weeks. Compared to baseline scores, both sides showed a significant improvement of mean Physician Assessment of Individual Signs (PAIS) ($p<0.001$) during follow up weeks 14–34. At week 34, the EL-treated nodules had a significantly better PAIS score compared to the CP-treated nodules ($p<0.05$). More patients reported marked improvement following EL (n=7) compared to CP (n=4). Less relapse of disease was seen following EL treatment. There was no significant difference in the pruritus scores between the two treatments. Author-noted limitations of the study included the small patient population, selection of more severely affected patients, loss of blinding due to sustained hyperpigmentation in the EL group and the use of various radiant exposures.

Professional Societies/Organizations: In 2007, the National Institute for Clinical Excellence (NICE) (United Kingdom) published a guidance document for the treatment of atopic eczema in children up to age 12 years. The clinical trials revealed limited evidence of the effectiveness of phototherapy in the treatment of children and possible serious adverse effects. The Guidance Development Group concluded that phototherapy should only be considered "for the treatment of severe atopic eczema in children when other management options have failed or are inappropriate and where there is a significant negative impact on quality of life." Laser therapy was not discussed as a treatment option.

Connective Tissue Disease, Including Cutaneous Graft Versus Host Disease (GVHD)
Connective tissue disease, also referred to as sclerosing skin diseases, includes numerous conditions that affect the connective tissue in various parts of the body. Sclerosing skin diseases include: necrobiosis lipoidica, systemic sclerosis, localized scleroderma, also known as morphea; sclerodermoid GVHD; extragenital lichen sclerosus et atrophicus; lupus erythematosus; and sclerodermoid rarities (e.g., eosinophilic fasciitis, pansclerotic morphea); and polyneuropathy, organomegaly, endocrinopathy, monoclonal gammopathy, and skin changes (POEMS) syndrome. Symptoms and treatment options vary according to each condition. In some diseases, topical steroids are indicated and in others, phototherapy and photochemotherapy are considered a treatment option. The choice of the best therapeutic option is contingent upon the disease entity and the clinical manifestations (Kerr, et al., 2012; Zandi, et al., 2012; Brenner, et al., 2005).

Literature Review: Systematic reviews, randomized controlled trials, and case series support the efficacy of UVA and PUVA for the treatment of sclerosing skin diseases (Buense, et al., 2012; Kroft, et al., 2008; Kreuter, et al., 2006; El-Mofty, et al., 2004; Polderman, et al., 2004; Wetzig, et al., 2005; Wolff, et al., 2004).

Cutaneous T-Cell Lymphoma, Including Mycosis Fungoides
Cutaneous T-cell lymphoma (CTCL) is a slowly evolving form of non-Hodgkin lymphoma of the T-cell. Early stages of the disease may present as distinctive lymphoid dermatoses, such as parapsoriasis, poikiloderma

atrophicans vasculare, follicular mucinosis (alopecia mucinosa), and pityriasis lichenoides. Two-thirds of CTCL cases are mycosis fungoides, a form of CTCL that evolves from scaly skin patches and plaques. Sezary syndrome is an aggressive form of mycosis fungoides. CTCL may initially be treated with topical chemotherapy agents. PUVA is a widely used treatment for early cutaneous T-cell lymphoma, mycosis fungoides and Sezary syndrome (Zandi, et al., 2010; National Cancer Institute, 2014; Olsen, et al., 2007; Gokdemir, et al., 2006; Habermann and Pittelkow, 2008; El-Mofty, et al., 2005).

Literature Review: Randomized controlled trials and case series support the safety and efficacy of phototherapy and photochemotherapy for the treatment of CTCL. The results from the clinical trials reported significant improvement to complete remission of T-cell lymphoma and mycosis fungoides (Farnaghi, et al., 2011; Ponte, et al., 2010; Gokdemir, et al., 2006; El-Mofty, et al., 2005; Scheinfeld, et al., 2003; Whitaker, et al., 2003).

Professional Societies/Organizations: The National Cancer Institute (2014) lists PUVA and UVB phototherapy as treatment options for mycosis fungoides and Sezary syndrome with early cutaneous stages achieving the best responses.

In their guidelines for non-Hodgkin's lymphoma, the National Comprehensive Cancer Network® (NCCN®) (2014) lists phototherapy as treatment options for mycosis fungoides and Sezary syndrome recommending UVB and nbUVB for patch/thin plaques and PUVA for the treatment of thicker plaques.

Lichen Planus
Lichen planus is an inflammatory disease that usually affects the skin and/or the mouth and is characterized by recurrent, itchy, inflammatory rash and/or lesions. Since there is no cure for lichen planus, treatment is aimed at relieving symptoms. Milder cases may be treated with corticosteroid creams and ointments, anti-inflammatory drugs, and antihistamines. More severe cases may require oral or injectable corticosteroids, phototherapy and photochemotherapy.

Literature Review: Although the evidence supporting the efficacy of phototherapy and photochemotherapy for lichen planus is primarily in the form of case series and retrospective reviews, these modalities are established treatment options for this condition when conventional therapies are not effective, not tolerated or are contraindicated. Partial and complete response have been reported in patients following therapy (Pavlotsky, et al., 2008; Wackernagle, et al., 2007; Saricaoglu, et al., 2003; Reichrath, et al., 2002).

There is insufficient evidence in the peer-reviewed literature to support the efficacy of excimer laser therapy for the treatment of lichen planus. Trehan et al. (2004) conducted a prospective case series to evaluate "the novel use" of low-dose 308-nm excimer laser therapy for the treatment of oral lichen planus (n=8). Follow-up visits occurred for up to 18 months. The volunteers for this study had active disease and had failed previous therapy (e.g., topical and systemic steroids, topical analgesics). The mean number of treatments was 21 (range 7–30). Statistically significant improvements were seen following treatments seven (p=0.02; n=8), 14 (p=0.002; n=8), 21 (p=0.02; n=7) and 28 (p=0.11; n=3). Five patients had an excellent response (i.e., > 75% improvement compared to baseline), two had fair improvement (i.e., 25–50% improvement compared to baseline) and one had poor results (i.e., < 25% improvement compared to baseline). There were no adverse events. Remission ranged from 2–17 months. The authors noted that further clinical trials were warranted to validate the results of this study. Limitations include the small, volunteer patient population; short-term follow-up; and lack of a control or comparison group.

Photodermatoses (e.g., Polymorphic Light Eruption, Actinic Prurigo, Chronic Actinic Dermatitis):
Photodermatoses refers to skin conditions that are aggravated by sunlight. The primary photodermatoses include polymorphic light eruption, actinic prurigo, and chronic actinic dermatitis, also known as photosensitivity dermatitis. Solar urticaria is a rare photodermatoses characterized by pruritis, erythema, pain and wheal formation. Treatment options include avoiding sun exposure, using sunscreens, and topical and/or oral steroids. Phototherapy is viewed as a mainstay of treatment for severe cases.

Literature Review: A limited number of studies in the form of randomized controlled trials and case series have reported that photodermatoses can be successfully treated with UVA, UVB, UVA/UVB, nbUVB phototherapy, and PUVA. Phototherapy and photochemotherapy are recognized treatment options for these conditions (Gambichler, et al., 2006; Ibbotson, et al., 2004).

Psoriasis
Psoriasis is a skin disease involving thickened, red areas covered with silvery scales and characterized by chronic, recurrent exacerbations and remissions. The forms of psoriasis include plaque, pustular (e.g., palmoplantar), inverse, erythrodermic and guttate. Medical management of psoriasis may include bath solutions, moisturizers, topical corticosteroid ointments and creams, vitamin D ointment, retinoid gel and coal tar (i.e., Goeckerman treatment). Phototherapy, photochemotherapy and excimer laser therapy are established treatment options for patients with psoriasis who do not respond to medical treatment.

Literature Review: Systematic reviews, randomized controlled trials, and case series support the safety and efficacy of phototherapy, photochemotherapy and excimer laser for the treatment of psoriasis. Studies have reported favorable response to treatment using bbUVB, nbUVB, PUVA, and followed by phototherapy (e.g., balneophototherapy). Phototherapy is considered an essential treatment option for psoriasis (Mudigonda, et al., 2012; Paul, et al., 2012; Khandpur and Sharma, 2012; Dayal, et al., 2010; Jain, et al., 2010; Mahajan, et al., 2010; Nistico, et al., 2009; Sivanesan, et al., 2009; Trott, et al., 2008; Brockow, et al., 2007; Erkin, et al., 2007; He, et al., 2007; Lapidoth, et al., 2007; Kirke, et al., 2007; Schiener, et al., 2007; Sezer, et al., 2007; Amornpinyokeit and Asawanonda, 2006; Boztepe, et al., 2006; Goldinger, et al., 2006; Nistico, et al., 2006; Yones, et al., 2006; Vongthongsri, et al., 2006; Asawanonda, et al., 2005; Kollner, et al., 2005; Lebwohl, et al., 2005; Berneburg, et al., 2005; Pahlajani, et al., 2005; Taibjee, et al., 2005; Zanoli, 2004; Tahir, et al., 2004; Taneja, et al., 2003; Trehan and Taylor, 2002; Rodewald, et al., 2002; Feldman, et al., 2002).

In a 2013 Cochrane Review, Chen et al. assessed the effectiveness of narrow-band (NB) UVB versus broad-band (BB) UVB or PUVA for the treatment of psoriasis including chronic plaque psoriasis (CPP), guttate psoriasis (GP) and palmoplantar psoriasis (PPP). Thirteen randomized controlled trials (n=662) met inclusion criteria. Primary outcomes included: participant-rated global improvement, percentage of participants reaching Psoriasis Area and Severity Index (PASI) 75 (i.e., ≥ 75% reduction in PASI score), withdrawal due to side-effects, and clearance rate. No studies compared NB-UVB to BB-UVB. NB-UVB and PUVA were similarly effective for treating people with CPP or GP. NB-UVB was considered ineffective for PPP and no significant difference was reported between NB-UVB and topical PUVA for clearing PPP. NB-UVB and BB-UVB were similar in clearing CPP. The authors noted that the evidence was heterogeneous and inconsistent and should be interpreted with caution.

The Agency for HealthCare Research and Quality (AHRQ) (2012) published an evidence-based comparative effectiveness review of biological and nonbiologic systemic agents and phototherapy for the treatment of chronic plaque psoriasis. Included studies had an adult patient population (age ≥ 18 years) with chronic plaque psoriasis (or psoriasis vulgaris), or evaluated and reported data on a subpopulation of adult patients with chronic plaque psoriasis. No randomized controlled trials and three observational studies (one fair and two poor in quality) compared systemic biologics with phototherapy. Follow-ups ranged from 10.3–12 weeks. The studies primarily included small international patient populations (n< 200). Statistical pooling of the data was not possible. AHRQ concluded that overall, there was insufficient evidence to determine the comparative effectiveness of individual therapies compared with each other between the specified classes. The comparisons that were made (adalimumab, etanercept, infliximab, and ustekinumab versus NB-UVB and etanercept and infliximab versus PUVA) revealed that there was insufficient evidence to evaluate health-related quality of life or other final health outcomes. There was also insufficient evidence to evaluate body surface area, Psoriasis Area and Severity Index (PASI), Physician's Global Assessment (PGA) score, psoriatic arthritis pain and pruritus.

Professional Societies/Organizations: In their guidelines on the treatment of psoriasis, the American Academy of Dermatology's (AAD) (Menter, et al., 2010) recommendations included UVB phototherapy, PUVA and excimer laser therapy. According to AAD, UVB phototherapy is safe and effective, and nbUVB phototherapy is generally preferable and has improved efficacy compared to bbUVB phototherapy. UVB phototherapy can be given in the office or at home. PUVA is also effective and may result in long remissions, but may increase the risk for squamous cell carcinoma and malignant melanoma. The duration of treatment using phototherapy or photochemotherapy varies depending on the type of psoriasis, skin type, ultraviolet dosing, and whether nbUVB (e.g., 15–20 treatments), bbUVB (e.g., 20–25 treatments), or topical or systemic PUVA is used. Improvement may be seen within 2–4 weeks and 8–40 treatments. AAD recommended excimer laser for the treatment of mild, moderate or severe psoriasis with less than 10% body surface area involvement. Initial dosage depends on the skin type and plaque characteristics and thickness. Treatment is typically administered two to three times

a week until the condition clears (average of 10–12 weeks). Mean remission time is reported to be 3.5–6 months.

In an evidence-based clinical consensus document, the National Psoriasis Foundation Medical Board identified two tiers for categorizing severity of disease. Localized therapy, which includes topical treatments and excimer laser treatments, is recommended for patients with psoriasis that affects less than 5% body surface area (BSA). Systemic therapy and/or phototherapy, which includes broad and narrowband phototherapy, photochemotherapy (PUVA), systemic agents, and biologics is recommended for patients with psoriasis affecting greater than 5% BSA; for those with less than 5% BSA affected in vulnerable areas, such as the face, genitals, hands or feet; and for other forms of psoriasis, including but not limited to erythrodermic, pustular and guttate. In addition, patients with limited affected areas and inadequate response to localized therapy or impairment in physical or mental functioning should also be considered candidates for systemic and/or phototherapy treatment (Pariser, et al., 2007).

Other Indications

Alopecia Areata: Alopecia areata is an autoimmune disorder affecting hair follicles and sometimes the nails. The hair stops growing and suddenly starts falling out in patches from the roots. The patches of hair loss enlarge and then grow back. The patient can experience total scalp hair loss (alopecia totalis), loss of all hair on the body (alopecia universalis) or diffuse thinning of the hair (alopecia areata incognita). Pitting and drainage of the nails may be seen in 10% of cases. Alopecia sometimes starts after a stressful event. There is no reliable cure for the disease. Spontaneous remission occurs in up to 80% of patients. Scalp creams, corticosteroids (topical and injectable) and contact immunotherapy have been used, but have not been shown to alter the course of the disease. Phototherapy, PUVA and excimer laser therapy have been proposed as treatment options but there is insufficient evidence in the published peer-reviewed scientific evidence to support these therapies for the treatment of alopecia areata. There is little documented evidence that UVB is effective and the limited success and long-term safety, side effects and a high relapse rate have curtailed the use of PUVA. There are few studies investigating excimer laser for the treatment of alopecia. Overall, studies investigating the effectiveness of UVB, PUVA and excimer laser are primarily in the form of case series and retrospective reviews with small patient populations (n=3–18) and short-term follow-ups (e.g., five weeks to six months). Outcomes varied depending on the type of alopecia and some patients had no response to therapy (New Zealand Dermatologic Society, 2013; Alkhalifah, et al., 2010; British Association of Dermatology, 2012).

Onychomycosis: Onychomycosis is infection of the nail bed and nail plate caused by any type of fungus (e.g., yeasts, nondermatophyte molds). The three main types of dermatophytic onychomycosis (also called tinea unguium) are distal subungual, proximal subungual and white superficialare. Dermatophyte fungi (e.g., Trichophyton sp.) are more likely to be pathogenic than nondermatophyte fungi, also referred to as molds (e.g., Fusarium sp.). Other types of onychomycosis include endonyx and totally dystrophic. One of several fingernails and/or toenails may be involved, but onychomycosis is more common on toenails. Onychomycosis can cause nail discoloration, thickening, irritation, pain and detachment of the nail plate. The presence of diabetes or other immunocompromised conditions may increase the risk of cellulites or other types of bacterial infection (Durme, 2012; Gupta, et al., 2011; Hoy, et al., 2012).

Treatment depends on the underlying cause and the patient's comorbities. Oral medications (e.g., terbinafin and itraconazole) may be used in immunocompromised patients. A topical antifungal nail lacquer with or without an oral agent may be indicated. Surgery may be used to treat an isolated nail infection involving only one digit or for the treatment of a dermatophytoma (i.e., collection of dermatophytes in solid form under the nail). Candidal onychomycosis responds to oral agents, but it is prone to relapse if the underlying reason for the infection is not resolved. Long-term recurrence rates of 20%–50% have been reported. Because of the varied response and side effects of oral agents and the high relapse rates, additional nonsystemic treatment modalities are being investigated. Phototherapy and laser therapy have been proposed for the treatment of onychomycosis but there is insufficient evidence in published clinical trials to support the safety and efficacy of these modalities (Durme, 2012; Gupta, et al., 2011; Hoy, et al., 2012; UpToDate®, 2012).

Gupta and Simpson, 2013 conducted a systematic review to determine the efficacy of laser therapy for the treatment of onychomycosis. A review of the literature identified three basic science articles, five peer-reviewed articles, and four pending clinical trials. The authors concluded that studies with large patient populations, mycologic examination before and after treatment, long-term follow-ups and standardized outcome measures

are needed to determine if laser therapy is effective for the treatment of onychomycosis or comparable to traditional pharmacotherapeutics.

Ledon et al. (2012) conducted a systematic review of published peer-reviewed studies for laser and light therapy for the treatment of onychomycosis. Ten clinical trials, primarily case series, met inclusion criteria. No studies included UV light or excimer laser therapy for the treatment of this condition.

Vitiligo: Vitiligo is an autoimmune disease resulting in a loss of pigment cells (i.e., melanocytes), producing white patches. Treatments that repigment the affected areas such as phototherapy, photochemotherapy and laser therapy are aimed at improving the untoward cosmetic sequelae associated with the condition and do not treat the underlying autoimmune condition. Self-management of vitiligo includes avoiding sun exposure, and using sunscreens and self-tanning dyes. In some cases, the use of interventions that repigment is only temporizing and may not result in long-term or permanent results. Follow-up data on the long-term effectiveness of phototherapy maintaining pigmentation are limited, but relapse has been reported in up to 25–44% of patients within 12–18 months following cessation of nbUVB therapy. Some patients have reportedly relapsed within three months (Nicolaidou, et al., 2009).

Other conditions: Phototherapy, photochemotherapy and/or excimer laser therapy have been proposed for numerous other dermatologic conditions including alopecia areata, chronic ordinary urticaria, chronic palmoplantar pustulosis, dyshidrotic eczema (vesicular eczema, pompholyx, cheiropompholyx or pedopompholyx), erythropoietic porphyria, granuloma annulare, cutaneous herpesvirus (e.g., herpes simplex type 1 and 2, varicella-zoster virus, human herpesvirus 7, Kaposi sarcoma), pityriasis rosea, prurigo nodularis or nodular prurigo, and/or urticaria pigmentosa (cutaneous mastocytosis) (Lim, et al., 2009, Nistico, et al. 2009; Engin, et al., 2008; Chuh, et. al., 2007; Gambichler, et al., 2005; Petering, et al., 2004).

There is insufficient evidence in the published peer-reviewed literature to support phototherapy, photochemotherapy and excimer laser therapy for these other conditions, nor are these therapies an established treatment option. Studies are primarily in the form of case series and retrospective reviews with small patient populations (n=8–22) and short-term follow-ups (e.g., five weeks to eight months) or case reports. Outcomes were conflicting and/or reported no improvement. Some studies combined phototherapy with topical steroids and have not investigated phototherapy as a monotherapy for a specific condition (Tan, et al., 2010; Lim, et al., 2009, Nistico, et al. 2009; Engin, et al., 2008; Chuh, et. al., 2007; Gambichler, et al., 2005; Petering, et al., 2004).

A limited number of randomized controlled trials with small patient populations and short-term follow-ups have investigated phototherapy and photochemotherapy for dermatologic conditions. Ko et al. (2011) conducted a randomized controlled trial to evaluate the efficacy of nbUVB (n=11) compared to a control group (n=10) who received no treatment for uremic pruritis in patients with stage III–V chronic kidney disease. At the 12-week follow-up, both groups showed significant improvement in the visual analogue scores (VAS) but there were no significant differences between the groups. Based on an interview questionnaire, the nbUVB groups reported improvement in the percentage of affected skin (p=0.004), in difficulty falling to sleep (p=0.02) and sleep disturbance (p=0.01). Phototherapy did not have a significant effect in reducing pruritis intensity compared to the control group. Petering et al. (2004) randomized high-dose UVA1 to PUVA for the treatment of chronic vesicular dyshidrotic eczema on the palms and backs of hands of 27 patients. Each hand was randomly treated with a different therapy. At the end of three weeks, the Dyshidrosis Area and Severity Index (DASI) scores improved to nearly half the pretreatment scores in both hands with no significant differences between the treatments.

Kelley and Rashid (2011) conducted a systematic review to evaluate published studies investigating phototherapy for the treatment of Herpesviridae (n=267). Eleven clinical trials and case reports included patients with herpes simplex, varicella-zoster, human herpesvirus, and Kaposi sarcoma. Studies included case reports or case series and randomized controlled trials with small patient populations, short-term follow-ups and various types of herpes. Long-term studies with large patient populations comparing phototherapy with conventional treatment modalities are needed. Phototherapy regimens for Herpesviridae have not been established.

Home Phototherapy

In some cases, UVB phototherapy may be transitioned to home use under the supervision of a physician if the individual has extensive, widespread disease (e.g., psoriasis) that is going to require long-term use, and office-based phototherapy has been proven to be effective. Home devices emitting predominantly narrowband UVB

phototherapy are used primarily for the treatment of psoriasis and require that the patient be motivated, reliable, adherent to instructions, able to administer the treatment correctly, keep records of exposure and attend regular follow-up visits. Opponents to home therapy cite issues related to patient poor compliance, suboptimal efficacy and greater potential for phototoxicity, erythema, burns, carcinogenesis and photoaging. Some propose limiting home phototherapy to those with overwhelming difficulties in traveling to a facility (Lapolla, et al., 2011; Menter, et al., 2010; Rajpara, et al., 2010).

There are various types of home UVB phototherapy devices available (i.e., full-body, half-body, hand and/or foot, localized/spot treatment units).

Full-body UVB panels include six-foot stand-alone panels, such as the 6-Foot Panosol II® (National Biological Corporation, Inc., Beachwood, OH). Half-body units include two- to four-foot stand-alone panels that are indicated for localized treatment areas (i.e., the back). An example of the half-body unit is the 2-Foot Panosol II®.

Hand and foot UVB units may be in the form of a combined unit or may be individual units. A combined unit has the appearance of a desk and allows the patient to place their hands and feet into the unit, receiving treatment simultaneously (e.g., Hand/Foot II™, National Biological Corporation, Inc., Beachwood, Inc., OH). Individual hand and foot units may have the appearance of a tabletop device such as the SolRX™ 500 Series (Solarc Systems, Inc., Ontario, Canada).

Localized/spot treatment devices may be a portable tabletop UVB device, such as the SolRx 500 mentioned above or a handheld wand-type device, like the DermaLume 2X™ (National Biological Corporation, Inc., Beachwood, OH), for small areas.

Once the size of unit is determined, a decision will be made by the physician as to the type of UVB light source indicated for treatment. The physician may prescribe bbUVB or nbUVB. The number of bulbs needed will be determined based on the size of the unit.

UVA phototherapy is primarily used in combination with psoralen (i.e, PUVA) for the treatment of disease (e.g., psoriasis) and is administered in an outpatient setting. On its own, UVA is ineffective in treating conditions such as psoriasis and atopic dermatitis and is therefore not generally used in the home setting.

Tanning beds, or units, which typically emit UVA, are used for self-tanning solely for the purpose of improvement in appearance (i.e., cosmetic); they are not medical devices designed to be used to administer physician-prescribed treatment for a dermatologic condition.

Literature Review: In a single-blind randomized controlled trial, Koek et al., 2009 compared the outcomes of outpatient UVB therapy (n=98) to home UVB therapy (n=98) for patients treated for mild to severe psoriasis. After the completion of therapy, the first 105 consecutive patients were followed for one year. Outcomes were measured by the self-administered psoriasis area and severity index (SAPASI) and the psoriasis area and severity index (PASI). Treatment effect indicated by the mean decline in the PASI and SAPASI scores was significant ($P<0.001$) and similar across groups ($P>0.3$) indicating that home therapy was as good as and in some cases, superior (SAPASI 90) to outpatient therapy. Improvement in quality life for home patients was rated as a 42% compared to 23% for outpatients. Total cumulative doses of ultraviolet B light and the occurrence of short term side effects were not significantly different between the groups.

Use Outside of the US
The National Institute for Health and Care Excellence (NICE) 2012 included phototherapy (broad or narrow-band UVB and PUVA) as a treatment option for psoriasis in their guideline for management of this condition. Nice recommends phototherapy for the treatment of plaque or guttate-pattern psoriasis that cannot be controlled with topical therapy. PUVA can be considered for the treatment of palmoplantar pustulosis. NICE stated that phototherapy should not be routinely used as a maintenance therapy.

The Scottish Intercollegiate Guidelines Network's (SIGN) 2010 national clinical guideline on psoriasis stated that patients who do not respond to topical therapy should be offered treatment with NBUVB phototherapy and PUVA should be offered to patients who do not respond to NBUVB. SIGN does not recommend BBUVB for the

treatment of psoriasis. NBUVB is recommended three times a week and home NBUVB is considered for patients who are unable to go to an outpatient facility.

The European Organization for Research and Treatment for Cancer (EORTC) (Belgium) (Trautinger, et al., 2006) consensus recommendations for the treatment of stages IA-III mycosis fungoides and Sezary syndrome include PUVA as a treatment option for these conditions.

Summary
Evidence in the published peer-reviewed scientific literature and professional society guidelines support the safety and effectiveness of phototherapy and photochemotherapy for the treatment of certain dermatologic conditions that are unresponsive to conventional medical management including: atopic dermatitis, connective tissue diseases, cutaneous T-cell lymphoma including mycosis fungoides, lichen planus, photodermatoses and psoriasis. Professional societies and evidence in the published peer-reviewed scientific literature support excimer laser therapy for the treatment of patients with psoriasis who are unresponsive to topical agents and/or phototherapy.

Phototherapy, photochemotherapy and excimer laser therapy for the treatment of vitiligo and alopecia areata are administered for the purpose of repigmentation and hair restoration, respectively to improve appearance and therefore, are cosmetic in nature.

There is insufficient evidence in the published peer-reviewed literature to support phototherapy, photochemotherapy and excimer laser therapy for all other dermatologic conditions. Studies are primarily in the form of case reports or case series and retrospective reviews with small patient populations and short term follow-ups. Outcomes are conflicting and in some cases reported no improvement in the condition being treated and/or high relapse rates. Improvement in net health outcomes for other dermatologic conditions has not been established.

Ultraviolet B (UVB) home phototherapy may be indicated in a subset of individuals who meet the criteria for office-based phototherapy and photochemotherapy, have gained benefit from office-based therapy, and phototherapy is expected to be long-term. The home phototherapy device and treatment regimen are prescribed by a physician and managed by periodic follow-up visits. The individual is motivated and compliant to the prescribed phototherapy usage.

The home-use of ultraviolet A (UVA) phototherapy has not been established. Tanning beds are not considered medical devices and are not used to treat medical conditions.

Coding/Billing Information

Note: 1) This list of codes may not be all-inclusive.
2) Deleted codes and codes which are not effective at the time the service is rendered may not be eligible for reimbursement

Office-Based Phototherapy and Photochemotherapy

Covered when medically necessary:

CPT®* Codes	Description
96900	Actinotherapy (ultraviolet light)
96910	Photochemotherapy; tar and ultraviolet B (Goeckerman treatment) or petrolatum and ultraviolet B
96912	Photochemotherapy; psoralens and ultraviolet A (PUVA)
96913	Photochemotherapy (Goeckerman and/or PUVA) for severe photoresponsive dermatoses requiring at least four to eight hours of care under direct supervision of the physician (includes application of medication and dressings)

Office-Based Excimer Laser Therapy

Covered when medically necessary:

CPT®* Codes	Description
96920	Laser treatment for inflammatory skin disease (psoriasis); total area less than 250 sq cm
96921	Laser treatment for inflammatory skin disease (psoriasis); 250 sq cm to 500 sq cm
96922	Laser treatment for inflammatory skin disease (psoriasis); over 500 sq cm

Treatment of Vitiligo

Not Medically Necessary/Cosmetic/Not Covered:

CPT®* Codes	Description
96900	Actinotherapy (ultraviolet light)
96910	Photochemotherapy; tar and ultraviolet B (Goeckerman treatment) or petrolatum and ultraviolet B
96912	Photochemotherapy; psoralens and ultraviolet A (PUVA)
96913	Photochemotherapy (Goeckerman and/or PUVA) for severe photoresponsive dermatoses requiring at least four to eight hours of care under direct supervision of the physician (includes application of medication and dressings)
96920	Laser treatment for inflammatory skin disease (psoriasis); total area less than 250 sq cm
96921	Laser treatment for inflammatory skin disease (psoriasis); 250 sq cm to 500 sq cm
96922	Laser treatment for inflammatory skin disease (psoriasis); over 500 sq cm

HCPCS Codes	Description
E0691	Ultraviolet light therapy system panel, includes bulbs/lamps, timer and eye protection; treatment area two square feet or less
E0692	Ultraviolet light therapy system panel, includes bulbs/lamps, timer and eye protection, four foot panel
E0693	Ultraviolet light therapy system panel, includes bulbs/lamps, timer and eye protection, six foot panel

Home Phototherapy Devices

Covered when medically necessary:

HCPCS Codes	Description
E0691	Ultraviolet light therapy system panel, includes bulbs/lamps, timer and eye protection; treatment area two square feet or less
E0692	Ultraviolet light therapy system panel, includes bulbs/lamps, timer and eye protection, four foot panel
E0693	Ultraviolet light therapy system panel, includes bulbs/lamps, timer and eye protection, six foot panel

Not Covered/Specifically Excluded Under Some Benefit Plans:

HCPCS Codes	Description
E0694	Ultraviolet multidirectional light therapy system in six foot cabinet, includes bulbs/lamps,

	timer and eye protection

***Current Procedural Terminology (CPT®) ©2013 American Medical Association: Chicago, IL.**

References

1. Agency for Healthcare Research and Quality (AHRQ). Effective Health Care Program. Comparative effectiveness review number 85. Biologic and Nonbiologic Systemic Agents and Phototherapy for Treatment of Chronic Plaque Psoriasis. Nov 2012. Accessed Apr 8, 2014. Available at URL address: http://www.effectivehealthcare.ahrq.gov/index.cfm/search-for-guides-reviews-and-reports/?pageaction=displayproduct&productid=1325&PCem=RA

2. Alkhalifah A, Alsantali A, Wang E, McElwee KJ, Shapiro J. Alopecia areata update: part II. Treatment. J Am Acad Dermatol. 2010 Feb;62(2):191-202.

3. Amornpinyokeit N, Asawanonda P. 8-Methoxypsoralen cream plus targeted narrowband ultraviolet B for psoriasis. Photodermatol Photoimmunol Photomed. 2006 Dec;22(6):285-9.

4. Asawanonda P, Chingchai A, Torranin P. Targeted UV-B phototherapy for plaque-type psoriasis. Arch Dermatol. 2005 Dec;141(12):1542-6.

5. Baltás E, Csoma Z, Bodai L, Ignácz F, Dobozy A, Kemény L. Treatment of atopic dermatitis with the xenon chloride excimer laser. J Eur Acad Dermatol Venereol. 2006 Jul;20(6):657-60.

6. Berneburg M, Rocken M, Benedix F. Phototherapy with narrowband vs broadband UVB. Acta Derm Venereol. 2005;85(2):98-108.

7. Boztepe G, Karaduman A, Sahin S, Hayran M, Kolemen F. The effect of maintenance narrow-band ultraviolet B therapy on the duration of remission for psoriasis: a prospective randomized clinical trial. Int J Dermatol. 2006 Mar;45(3):245-50.

8. Brenner M, Herzinger T, Berking C, Plewig G, Degitz K. Phototherapy and photochemotherapy of sclerosing skin diseases. Photodermatol Photoimmunol Photomed. 2005 Jun;21(3):157-65.

9. Brenninkmeijer EE, Spuls PI, Lindeboom R, van der Wal AC, Bos JD, Wolkerstorfer A. Excimer laser vs. clobetasol propionate 0·05% ointment in prurigo form of atopic dermatitis: a randomized controlled trial, a pilot. Br J Dermatol. 2010 Oct;163(4):823-31.

10. British Association of Dermatologists. Guidelines for the management of lichen sclerosus. Oct 4, 2010. Accessed Apr 8, 2014. Available at URL address: http://www.bad.org.uk/healthcare-professionals/clinical-standards/clinical-guidelines

11. British Association of Dermatologists. Guidelines for the management of alopecia areata. May 2012. Accessed Apr 8, 2014. Available at URL address: http://www.bad.org.uk/healthcare-professionals/clinical-standards/clinical-guidelines

12. Brockow T, Schiener R, Franke A, Resch KL, Peter RU. A pragmatic randomized controlled trial on the effectiveness of highly concentrated saline spa water baths followed by UVB compared to UVB only in moderate to severe psoriasis. J Altern Complement Med. 2007 Sep;13(7):725-32.

13. Brown S, Reynolds NJ. Atopic and non-atopic eczema. BMJ. 2006 Mar 11;332(7541):584-8.

14. Buense R, Duarte IA, Bouer M. Localized scleroderma: assessment of the therapeutic response to phototherapy. An Bras Dermatol. 2012 Jan-Feb;87(1):63-9.

15. Clayton TH, Clark SM, Turner D, Goulden V. The treatment of severe atopic dermatitis in childhood with narrowband ultraviolet B phototherapy. Clin Exp Dermatol. 2007 Jan;32(1):28-33.

16. Chalmers R, Hollis S, Leonardi-Bee J, Griffiths CEM, Marsland Bsc MRCP A. Interventions for chronic palmoplantar pustulosis. Cochrane Database of Systematic Reviews 2006, Issue 1. Art. No.: CD001433. DOI: 10.1002/14651858.CD001433.pub2.

17. Chen X, Yang M, Cheng Y, Liu GJ, Zhang M. Narrow-band ultraviolet B phototherapy versus broad-band ultraviolet B or psoralen-ultraviolet A photochemotherapy for psoriasis. Cochrane Database of Systematic Reviews 2013, Issue 10. Art. No.: CD009481. DOI: 10.1002/14651858.CD009481.pub2.

18. Chuh AAT, Dofitas BL, Comisel G, Reveiz L, Sharma V, Garner SE, Chu FKM. Interventions for pityriasis rosea. Cochrane Database of Systematic Reviews 2007, Issue 2. Art. No.: CD005068. DOI: 10.1002/14651858.CD005068.pub2.

19. Dayal S, Mayanka, Jain VK. Comparative evaluation of NBUVB phototherapy and PUVA photochemotherapy in chronic plaque psoriasis. Indian J Dermatol Venereol Leprol 2010;76:533-7

20. Duarte I, Nina BI, Gordiano MC, Buense R, Lazzarini R Progressive macular hypomelanosis: an epidemiological study and therapeutic response to phototherapy. An Bras Dermatol. 2010 Oct;85(5):621-4.

21. Durme DJ. Ch 4 Disease of the skin. In: Bope & Kellerman: Conn's Current Therapy 2013, 1st ed. Saunders. St. Louis MO, 2012. Pgs242-244.

22. El-Mofty M, Mostafa W, El-Darouty M, Bosseila M, Nada H, Yousef R, et al. Different low doses of broad-band UVA in the treatment of morphea and systemic sclerosis. Photodermatol Photoimmunol Photomed. 2004 Jun;20(3):148-56.

23. El-Mofty M, El-Darouty M, Salonas M, Bosseila M, Sobeih S, Leheta T, Nada H, Tawdy A, Amin I, El-Enany G. Narrow band UVB (311 nm), psoralen UVB (311 nm) and PUVA therapy in the treatment of early-stage mycosis fungoides: a right-left comparative study. Photodermatol Photoimmunol Photomed. 2005 Dec;21(6):281-6.

24. Engin B, Ozdemir M, Balevi A, Mevlitoğlu I. Treatment of chronic urticaria with narrowband ultraviolet B phototherapy: a randomized controlled trial. Acta Derm Venereol. 2008;88(3):247-51.

25. Erkin G, Uğur Y, Gürer CK, Aşan E, Korkusuz P, Sahin S, Kölemen F. Effect of PUVA, narrow-band UVB and cyclosporin on inflammatory cells of the psoriatic plaque. J Cutan Pathol. 2007 Mar;34(3):213-9.

26. Farnaghi F, Seirafi H, Ehsani AH, Agdari ME, Noormohammadpour P. Comparison of the therapeutic effects of narrow band UVB vs. PUVA in patients with pityriasis lichenoides. J Eur Acad Dermatol Venereol. 2011 Aug;25(8):913-6. doi: 10.1111/j.1468-3083.2010.03879.x.

27. Feldman SR, Mellen BG, Housman TS, Fitzpatrick RE, Geronemus RG, Friedman PM, et al. Efficacy of the 308-nm excimer laser for treatment of psoriasis: results of a multicenter study. J Am Acad Dermatol. 2002 Jun;46(6):900-6.

28. Gambichler T, Breuckmann F, Boms S, Altmeyer P, Kreuter A. Narrowband UVB phototherapy in skin conditions beyond psoriasis. J Am Acad Dermatol. 2005 Apr;52(4):660-70.

29. Gambichler T, Hyun J, Sommer A, Stucker M, Altmeyer P, Kreuter A. A randomised controlled trial on photo(chemo)therapy of subacute prurigo. Clin Exp Dermatol. 2006 May;31(3):348-53.

30. Gambichler T1, Terras S, Kreuter A. Treatment regimens, protocols, dosage, and indications for UVA1 phototherapy: facts and controversies. Clin Dermatol. 2013 Jul-Aug;31(4):438-54.

31. Gokdemir G, Barutcuoglu B, Sakiz D, Koslu A. Narrowband UVB phototherapy for early-stage mycosis fungoides: evaluation of clinical and histopathological changes. J Eur Acad Dermatol Venereol. 2006 Aug;20(7):804-9.

32. Goldinger SM, Dummer R, Schmid P, Prinz Vavricka M, Burg G, Lauchli S. Excimer laser versus narrow-band UVB (311 nm) in the treatment of psoriasis vulgaris. Dermatology. 2006;213(2):134-9.

33. Groysman v, Sami N. Vitiligo. Dec 8, 2010. Accessed Mar 6, 2011. Available at URL address: http://emedicine.medscape.com/article/1068962-print

34. Gupta AK, Drummond-Main C, Cooper EA, Brintnell W, Piraccini BM, Tosti A. Systematic review of nondermatophyte mold onychomycosis: diagnosis, clinical types, epidemiology, and treatment. J Am Acad Dermatol. 2012 Mar;66(3):494-502.

35. Gupta AK, Simpson FC. Laser therapy for onychomycosis. J Cutan Med Surg. 2013 Sep-Oct;17(5):301-7.

36. Habermann TM, Pittelkow MR, Ch 113: Cutaneous T-Cell Lymphoma and Cutaneous B-Cell Lymphoma. In: Abeloff's Clinical Oncology, 4th ed. Orlando: W.B. Saunders; 2008.

37. Hammes S, Hermann J, Roos S, Ockenfels H. UVB 308-nm excimer light and bath PUVA: combination therapy is very effective in the treatment of prurigo nodularis. J Eur Acad Dermatol Venereol. 2010 Oct 15.

38. He YL, Zhang XY, Dong J, Xu JZ, Wang J. Clinical efficacy of a 308 nm excimer laser for treatment of psoriasis vulgaris. Photodermatol Photoimmunol Photomed. 2007 Dec;23(6):238-41.

39. Honigsmann H. Mechanisms of phototherapy and photochemotherapy for photodermatoses. Dermatol Ther. 2003;16(1):23-7.

40. Hoy NY, Leung AK, Metelitsa AI, Adams S. New concepts in median nail dystrophy, onychomycosis, and hand, foot, and mouth disease nail pathology. ISRN Dermatol. 2012;2012:680163.

41. Iordanou E, Berneburg M. Phototherapy and photochemotherapy. J Dtsch Dermatol Ges. 2010 Jul;8(7):533-41.

42. Jain VK, Jangra S, Aggarwal K. Comparative efficacy of narrow-band ultraviolet B phototherapy alone and its combination with topical 8-methoxypsoralen in psoriasis. Indian J Dermatol Venereol Leprol. 2010 Nov-Dec;76(6):666-70.

43. Jury CS, McHenry P, Burden AD, Lever R, Bilsland D. Narrowband ultraviolet B (UVB) phototherapy in children. Clin Exp Dermatol. 2006 Mar;31(2):196-9.

44. Kelley JP, Rashid RM. Phototherapy in the treatment of cutaneous herpesvirus manifestations. Cutis. 2011 Sep;88(3):140-8.

45. Kerr AC, Ferguson J, Attili SK, Beattie PE, Coleman AJ, Dawe RS, Eberlein B, Goulden V, Ibbotson SH, Menage HD, Moseley H, Novakovic L, Walker SL, Woods JA, Young AR, Sarkany RP. Ultraviolet A1 phototherapy: a British Photodermatology Group workshop report. Clin Exp Dermatol. 2012 Jan 25.

46. Khandpur S, Sharma VK. Comparison of clobetasol propionate cream plus coal tar vs. topical psoralen and solar ultraviolet A therapy in palmoplantar psoriasis. Clin Exp Dermatol. 2011 Aug;36(6):613-6.

47. Kirke SM, Lowder S, Lloyd JJ, Diffey BL, Matthews JN, Farr PM. A randomized comparison of selective broadband UVB and narrowband UVB in the treatment of psoriasis. J Invest Dermatol. 2007 Jul;127(7):1641-6.

48. Ko MJ, Yang JY, Wu HY, Hu FC, Chen SI, Tsai PJ, Jee SH, Chiu HC. Narrowband ultraviolet B phototherapy for patients with refractory uraemic pruritus: a randomized controlled trial. Br J Dermatol. 2011 Sep;165(3):633-9.

49. Koek MB, Buskens E, van Weelden H, Steegmans PH, Bruijnzeel-Koomen CA, Sigurdsson V. Home versus outpatient ultraviolet B phototherapy for mild to severe psoriasis: pragmatic multicentre randomised controlled non-inferiority trial (PLUTO study). BMJ. 2009 May 7;338:b1542. doi: 10.1136/bmj.b1542.

50. Kollner K, Wimmershoff MB, Hintz C, Landthaler M, Hohenleutner U. Comparison of the 308-nm excimer laser and a 308-nm excimer lamp with 311-nm narrowband ultraviolet B in the treatment of psoriasis. Br J Dermatol. 2005 Apr;152(4):750-4.

51. Kreuter A, Hyun J, Stucker M, Sommer A, Altmeyer P, Gambichler T. A randomized controlled study of low-dose UVA1, medium-dose UVA1, and narrowband UVB phototherapy in the treatment of localized scleroderma. J Am Acad Dermatol. 2006 Mar;54(3):440-7.

52. Kroft EB, Berkhof NJ, van de Kerkhof PC, Gerritsen RM, de Jong EM. Ultraviolet A phototherapy for sclerotic skin diseases: a systematic review. J Am Acad Dermatol. 2008 Dec;59(6):1017-30.

53. Lapidoth M, Adatto M, David M. Targeted UVB phototherapy for psoriasis: a preliminary study. Clin Exp Dermatol. 2007 Nov;32(6):642-5.

54. Lapolla W, Yentzer BA, Bagel J, Halvorson CR, Feldman SR. A review of phototherapy protocols for psoriasis treatment. J Am Acad Dermatol. 2011 May;64(5):936-49. Epub 2011 Mar 22.

55. Lebwohl M, Ting PT, Koo JY. Psoriasis treatment: traditional therapy. Ann Rheum Dis. 2005 Mar;64 Suppl 2:ii83-6.

56. Ledon JA, Savas J, Franca K, Chacon A, Nouri K. Laser and light therapy for onychomycosis: a systematic review. Lasers Med Sci. 2012 Nov 20. [Epub ahead of print].

57. Lim SH, Kim SM, Oh BH, Ko JH, Lee YW, Choe YB, Ahn KJ. Low-dose Ultraviolet A1 Phototherapy for Treating Pityriasis Rosea. Ann Dermatol. 2009 Aug;21(3):230-6.

58. Mahajan R, Kaur I, Kanwar AJ. Methotrexate/narrowband UVB phototherapy combination vs. narrowband UVB phototherapy in the treatment of chronic plaque-type psoriasis--a randomized single-blinded placebo-controlled study. J Eur Acad Dermatol Venereol. 2010 May;24(5):595-600.

59. Martin JA, Laube S, Edwards C, Gambles B, Anstey AV. Rate of acute adverse events for narrow-band UVB and Psoralen-UVA phototherapy. Photodermatol Photoimmunol Photomed. 2007 Apr-Jun;23(2-3):68-72.

60. Meduri NB, Vandergriff T, Rasmussen H, Jacobe H. Phototherapy in the management of atopic dermatitis: a systematic review. Photodermatol Photoimmunol Photomed. 2007 Aug;23(4):106-12.

61. Menter A, Gottlieb A, Feldman SR, Van Voorhees AS, Leonardi CL, Gordon KB, Lebwohl M, Koo JY, Elmets CA, Korman NJ, Beutner KR, Bhushan R. Guidelines of care for the management of psoriasis and psoriatic arthritis: Section 1. Overview of psoriasis and guidelines of care for the treatment of psoriasis with biologics. J Am Acad Dermatol. 2008 May;58(5):826-50.

62. Menter A, Korman NJ, Elmets CA, Feldman SR, Gelfand JM, Gordon KB, Gottlieb A, Koo JY, Lebwohl M, Lim HW, Van Voorhees AS, Beutner KR, Bhushan R. Guidelines of care for the management of psoriasis and psoriatic arthritis: Section 5. Guidelines of care for the treatment of psoriasis with phototherapy and photochemotherapy. J Am Acad Dermatol. 2010 Jan;62(1):114-35. Accessed Apr 8, 2014. Available at URL address: http://www.aad.org/research/guidelines/index.html

63. Millard TP, Hawk JL. Photosensitivity disorders: cause, effect and management.Am J Clin Dermatol. 2002;3(4):239-46.

64. Mofty ME, Zaher H, Esmat S, Youssef R, Shahin Z, Bassioni D, Enani GE. PUVA and PUVB in vitiligo--are they equally effective? Photodermatol Photoimmunol Photomed. 2001 Aug;17(4):159-63.

65. Mudigonda T, Dabade TS, Feldman SR. A review of targeted ultraviolet B phototherapy for psoriasis. J Am Acad Dermatol. 2012 Apr;66(4):664-72.

66. National Cancer Institute. Mycosis Fungoides and the Sézary Syndrome (PDQ®): treatment. Health professional version. Jan 24, 2014. Accessed Apr 7, 2014. Available at URL address: http://www.cancer.gov/cancertopics/pdq/treatment/mycosisfungoides/healthprofessional/allpages

67. National Comprehensive Cancer Network® (NCCN®). NCCN clinical practice guidelines in oncology (NCCN Guidelines). Non-hodgkin's lymphoma. V.2.2014. Mar 27, 2014. Accessed Apr 8, 2014. Available at URL address: http://www.nccn.org/professionals/physician_gls/f_guidelines.asp#site

68. National Institute for Health and Clinical Excellence (NICE). Atopic eczema in children management of atopic eczema in children from birth up to the age of 12 years. Dec 2007. Accessed Apr 7, 2014. Available at URL address: http://guidance.nice.org.uk/CG57

69. National Institute for Health and Clinical Excellence (NICE). Psoriasis. Nov 2, 2012. Accessed Apr 7, 2014. Available at URL address: http://guidance.nice.org.uk/CG153

70. New Zealand Dermatological Society Incorporated. Alopecia areata. 2013. Accessed Apr 8, 2014. Available at URL address: http://dermnetnz.org/hair-nails-sweat/alopecia-areata.html

71. Nicolaidou E, Antoniou C, Stratigos A, Katsambas AD. Narrowband ultraviolet B phototherapy and 308-nm excimer laser in the treatment of vitiligo: a review. J Am Acad Dermatol. 2009 Mar;60(3):470-7.

72. Nisticò SP, Saraceno R, Stefanescu S, Chimenti S. A 308-nm monochromatic excimer light in the treatment of palmoplantar psoriasis. J Eur Acad Dermatol Venereol. 2006 May;20(5):523-6.

73. Nisticò SP, Saraceno R, Schipani C, Costanzo A, Chimenti S. Different applications of monochromatic excimer light in skin diseases. Photomed Laser Surg. 2009 Aug;27(4):647-54.

74. Olsen E, Vonderheid E, Pimpinelli N, Willemze R, Kim Y, Knobler R, Zackheim H, Duvic M, Estrach T, Lamberg S, Wood G, Dummer R, Ranki A, Burg G, Heald P, Pittelkow M, Bernengo MG, Sterry W, Laroche L, Trautinger F, Whittaker S; ISCL/EORTC. Revisions to the staging and classification of mycosis fungoides and Sezary syndrome: a proposal of the International Society for Cutaneous Lymphomas (ISCL) and the cutaneous lymphoma task force of the European Organization of Research and Treatment of Cancer (EORTC). Blood. 2007 Sep 15;110(6):1713-22.

75. Pahlajani N, Katz BJ, Lozano AM, Murphy F, Gottlieb A. Comparison of the efficacy and safety of the 308 nm excimer laser for the treatment of localized psoriasis in adults and in children: a pilot study. Pediatr Dermatol. 2005 Mar-Apr;22(2):161-5.

76. Pariser DM, Bagel J, Gelfand JM, Korman NJ, Ritchlin CT, Strober BE, Van Voorhees AS, Young M, Rittenberg S, Lebwohl MG, Horn EJ; National Psoriasis Foundation. National Psoriasis Foundation clinical consensus on disease severity. Arch Dermatol. 2007 Feb;143(2):239-42.

77. Paul C, Gallini A, Archier E, Castela E, Devaux S, Aractingi S, Aubin F, Bachelez H, Cribier B, Joly P, Jullien D, Le Maître M, Misery L, Richard MA, Ortonne JP. Evidence-based recommendations on topical treatment and phototherapy of psoriasis: systematic review and expert opinion of a panel of dermatologists. J Eur Acad Dermatol Venereol. 2012 May;26 Suppl 3:1-10.

78. Pavlotsky F, Nathansohn N, Kriger G, Shpiro D, Trau H. Ultraviolet-B treatment for cutaneous lichen planus: our experience with 50 patients. Photodermatol Photoimmunol Photomed. 2008 Apr;24(2):83-6.

79. Petering H, Breuer C, Herbst R, Kapp A, Werfel T. Comparison of localized high-dose UVA1 irradiation versus topical cream psoralen-UVA for treatment of chronic vesicular dyshidrotic eczema. J Am Acad Dermatol. 2004 Jan;50(1):68-72.

80. Polderman MC, le Cessie S, Huizinga TW, Pavel S. Efficacy of UVA-1 cold light as an adjuvant therapy for systemic lupus erythematosus. Rheumatology (Oxford). 2004 Nov;43(11):1402-4.

81. Ponte P, Serrão V, Apetato M. Efficacy of narrowband UVB vs. PUVA in patients with early-stage mycosis fungoides. J Eur Acad Dermatol Venereol. 2010 Jun;24(6):716-21.

82. Rajpara AN, O'Neill JL, Nolan BV, Yentzer BA, Feldman SR. Review of home phototherapy. Dermatol Online J. 2010 Dec 15;16(12):2.

83. Reichrath J, Reinhold U, Tilgen W. Treatment of genito-anal lesions in inflammatory skin diseases with PUVA cream photochemotherapy: an open pilot study in 12 patients.Dermatology. 2002;205(3):245-8.

84. Rodewald EJ, Housman TS, Mellen BG, Feldman SR. Follow-up survey of 308-nm laser treatment of psoriasis. Lasers Surg Med. 2002;31(3):202-6.

85. Saricaoglu H, Karadogan SK, Baskan EB, Tunali S. Narrowband UVB therapy in the treatment of lichen planus.Photodermatol Photoimmunol Photomed. 2003 Oct;19(5):265-7.

86. Scheinfeld N, Deleo V. A review of studies that have utilized different combinations of psoralen and ultraviolet B phototherapy and ultraviolet A phototherapy. Dermatol Online J. 2003 Dec;9(5):7.

87. Schiener R, Brockow T, Franke A, Salzer B, Peter RU, Resch KL. Bath PUVA and saltwater baths followed by UV-B phototherapy as treatments for psoriasis: a randomized controlled trial. Arch Dermatol. 2007 May;143(5):586-96.

88. Sezer E, Erbil AH, Kurumlu Z, Taştan HB, Etikan I. Comparison of the efficacy of local narrowband ultraviolet B (NB-UVB) phototherapy versus psoralen plus ultraviolet A (PUVA) paint for palmoplantar psoriasis. J Dermatol. 2007 Jul;34(7):435-40.

89. Sezer E, Etikan I. Local narrowband UVB phototherapy vs. local PUVA in the treatment of chronic hand eczema. Photodermatol Photoimmunol Photomed. 2007 Feb;23(1):10-4.

90. Sivanesan SP, Gattu S, Hong J, Chavez-Frazier A, Bandow GD, Malick F, Kricorian G, Koo J. Randomized, double-blind, placebo-controlled evaluation of the efficacy of oral psoralen plus ultraviolet A for the treatment of plaque-type psoriasis using the Psoriasis Area Severity Index score (improvement of 75% or greater) at 12 weeks. J Am Acad Dermatol. 2009 Nov;61(5):793-8.

91. Taibjee SM, Cheung ST, Laube S, Lanigan SW. Controlled study of excimer and pulsed dye lasers in the treatment of psoriasis. Br J Dermatol. 2005 Nov;153(5):960-6.

92. Tahir R, Mujtaba G. Comparative efficacy of psoralen - UVA photochemotherapy versus narrow band UVB phototherapy in the treatment of psoriasis. J Coll Physicians Surg Pak. 2004 Oct;14(10):593-5.

93. Tan E, Lim D, Rademaker M. Narrowband UVB phototherapy in children: A New Zealand experience. Australas J Dermatol. 2010 Nov;51(4):268-73. doi: 10.1111/j.1440-0960.2010.00701.x.

94. Taneja A, Trehan M, Taylor CR. 308-nm excimer laser for the treatment of psoriasis: induration-based dosimetry. Arch Dermatol. 2003 Jun;139(6):759-64.

95. Trautinger F, Knobler R, Willemze R, Peris K, Stadler R, Laroche L, D'Incan M, Ranki A, Pimpinelli N, Ortiz-Romero P, Dummer R, Estrach T, Whittaker S. EORTC consensus recommendations for the treatment of mycosis fungoides/Sezary syndrome. Eur J Cancer. 2006 May;42(8):1014-30.

96. Trehan M, Taylor CR. High-dose 308-nm excimer laser for the treatment of psoriasis. J Am Acad Dermatol. 2002 May;46(5):732-7.

97. Trehan M, Taylor CR. Low-dose excimer 308-nm laser for the treatment of oral lichen planus. Arch Dermatol. 2004 Apr;140(4):415-20.

98. Trott J, Gerber W, Hammes S, Ockenfels HM. The effectiveness of PUVA treatment in severe psoriasis is significantly increased by additional UV 308-nm excimer laser sessions. Eur J Dermatol. 2008 Jan-Feb;18(1):55-60.

99. Tzaneva S, Kittler H, Holzer G, Reljic D, Weber M, Hönigsmann H, Tanew A. 5-Methoxypsoralen plus ultraviolet (UV) A is superior to medium-dose UVA1 in the treatment of severe atopic dermatitis: a randomized crossover trial. Br J Dermatol. 2010 Mar;162(3):655-60.

100. U.S. Food and Drug Administration (FDA). Summary of safety and effectiveness K050080. Excilite and Excilite-µ phototherapy systems. May 5, 2005. Accessed Apr 8, 2014. Available at URL address: http://www.accessdata.fda.gov/cdrh_docs/pdf5/K050080.pdf

101. U.S. Food and Drug Administration (FDA). Summary of safety and effectiveness K073066. 308 Excimer Lamp Phototherapy system. Dec 26, 2007. Accessed Apr 8, 2014. Available at URL address: http://www.accessdata.fda.gov/cdrh_docs/pdf7/K073066.pdf

102. U.S. Food and Drug Administration (FDA). Summary of safety and effectiveness K080975. FENCER Excimer Laser System. Jul 15, 2008. Accessed Apr 8, 2014. Available at URL address: http://www.accessdata.fda.gov/cdrh_docs/pdf8/K080975.pdf

103. U.S. Food and Drug Administration (FDA). Summary of safety and effectiveness K040062. Levia Phototherapy System. Feb 13, 2004. Accessed Apr 8, 2014. Available at URL address: http://www.accessdata.fda.gov/cdrh_docs/pdf4/K040062.pdf

104. Vongthongsri R, Konschitzky R, Seeber A, Treitl C, Honigsmann H, Tanew A. Randomized, double-blind comparison of 1 mg/L versus 5 mg/L methoxsalen bath-PUVA therapy for chronic plaque-type psoriasis.J Am Acad Dermatol. 2006 Oct;55(4):627-31.

105. Wackernagel A, Legat FJ, Hofer A, Quehenberger F, Kerl H, Wolf P. Psoralen plus UVA vs. UVB-311 nm for the treatment of lichen planus. Photodermatol Photoimmunol Photomed. 2007 Feb;23(1):15-9.

106. Weberschock T, Strametz R, Lorenz M, Röllig C, Bunch C, Bauer A, Schmitt J. Interventions for mycosis fungoides. Cochrane Database of Systematic Reviews 2013, Issue 6. Art. No.: CD008946. DOI: 10.1002/14651858.CD008946.pub2

107. Wetzig T, Sticherling M, Simon JC, Hegenbart U, Niederwieser D, Al-Ali HK. Medium dose long-wavelength ultraviolet A (UVA1) phototherapy for the treatment of acute and chronic graft-versus-host disease of the skin. Bone Marrow Transplant. 2005 Mar;35(5):515-9.

108. Whittaker SJ, Marsden JR, Spittle M, Russell Jones R; British Association of Dermatologists; U.K. Cutaneous Lymphoma Group. Joint British Association of Dermatologists and U.K. Cutaneous Lymphoma Group guidelines for the management of primary cutaneous T-cell lymphomas. Br J Dermatol. 2003 Dec;149(6):1095-1107.

109. Whitton ME, Pinart M, Batchelor J, Lushey C, Leonardi-Bee J, González U. Interventions for vitiligo. Cochrane Database of Systematic Reviews 2010, Issue 1. Art. No.: CD003263. DOI: 10.1002/14651858.CD003263.pub4.

110. Wise RD. A review of atopic dermatitis. Compr Ther. 2006 Summer;32(2):111-7.

111. Yones SS, Palmer RA, Garibaldinos TM, Hawk JL. Randomized double-blind trial of treatment of vitiligo: efficacy of psoralen-UV-A therapy vs Narrowband-UV-B therapy. Arch Dermatol. 2007 May;143(5):578-84.

112. Yones SS, Palmer RA, Garibaldinos TT, Hawk JL. Randomized double-blind trial of the treatment of chronic plaque psoriasis: efficacy of psoralen-UV-A therapy vs narrowband UV-B therapy. Arch Dermatol. 2006 Jul;142(7):836-42.

113. Zandi S, Kalia S, Lui H. UVA1 Phototherapy: A Concise and Practical Review. Skin Therapy Lett. 2012 Jan;17(1):1-3.

114. Zanolli M. Phototherapy arsenal in the treatment of psoriasis. Dermatol Clin. 2004 Oct;22(4):397-406, viii.