

## Psoriasis Primer

### What is it?

Psoriasis (sore-I-ah-sis) is a persistent skin disease that got its name from the Greek word for "itch." The skin becomes inflamed, producing red, thickened areas with silvery scales, most often on the scalp, elbows, knees, and lower back.

The National Psoriasis Foundation defines psoriasis as "a common immune-mediated chronic skin disease that comes in different forms and varying levels of severity. Most researchers now conclude that it is related to the immune system (psoriasis is often called an "immune-mediated" disorder)."

Psoriasis is not contagious. More than 4.4 million adults in the United States have it. Between 10 percent and 30 percent of people with psoriasis also develop a related form of arthritis, called psoriatic (sore-ee-AA-tic) arthritis.

The National Psoriasis Web site [<http://www.psoriasis.org>] is an invaluable resource for information. All company and independent sales representatives should review the information at this web site prior to discussing the features and benefits of the DuaLight System with prospective physician customers.

### Are there different types of psoriasis?

There are five different types of psoriasis. The most common form of psoriasis is called "plaque psoriasis," which is characterized by well-defined patches of red, raised skin. About 80 percent of people with psoriasis have this type. Plaque psoriasis can appear on any skin surface, although the knees, elbows, scalp, trunk and nails are the most common locations.

The other types of psoriasis are:

- Guttate: small, red, individual drops on the skin
- Inverse: smooth, dry areas of skin, often in folds or creases, that are red and inflamed but do not have scaling
- Erythrodermic: periodic, widespread, fiery redness of the skin
- Pustular: involves either generalized, widespread areas of reddened skin, or localized areas, particularly the hands and feet (palmo-plantar pustular psoriasis)
- UV Phototherapy is effective in the treatment of all types of psoriasis. However, certain types may be more resistant to therapy. The major application of the DuaLight System will be in the treatment of moderate plaque psoriasis.

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## What treatment options are available?

There is no cure for psoriasis. Various treatment options are available, all of which work to drive the disease into remission for periods of weeks, months, or years. The effectiveness of treatment and the duration of remission is highly patient dependent. However, UV phototherapy is supported by over 20 years of successful use.

Topical Treatments – A common treatment option for psoriasis is the use of topical medications, the most common of which are:

- **Steroids:** Steroids are a class of topical medications. Also called "corticosteroids", they are among the most commonly prescribed therapies for mild to moderate psoriasis.
- **Coal tar:** Topical coal tar preparations have helped treat the scaling, inflammation and itching of psoriasis for hundreds of years.
- **Calcipotriene:** Calcipotriene (brand name Dovonex) is a synthetic (man-made) form of vitamin D3 that is used to treat mild to moderate psoriasis.
- **Anthralin:** Anthralin is a prescription topical medication. It has been used to treat psoriasis for more than 100 years.
- **Salicylic acid:** Salicylic acid is found in keratolytic products that are used to loosen scale. Keratolytics are products that include shampoos, soaps, lotions and gels.
- **Tazarotene:** Tazarotene (brand name Tazorac) is a prescription topical retinoid (vitamin A derivative) approved for treating mild to moderate plaque psoriasis.
- **Other topicals:** People with psoriasis can also reduce redness and itching by keeping their skin lubricated. Moisturizers, bath solutions and nonprescription medications, including coal tar and salicylic acid, can help skin heal by keeping it flexible.

Systemic Medications – Systemic medications usually are reserved for psoriasis that becomes extensive or disabling. They are system-wide (affect the entire body) treatments for moderate to severe psoriasis that isn't responsive to topical medications or phototherapy treatments.

- **Methotrexate:** Methotrexate (MTX) is used for extensive or disabling psoriasis, especially acute pustular and erythrodermic psoriasis.
- **Cyclosporine:** Cyclosporine (brand name Neoral) is a systemic medication taken by adult patients with severe, difficult-to-treat psoriasis. It, too, is useful for patients with acute pustular and erythrodermic psoriasis.

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- **Oral Retinoids:** Oral retinoids are related to vitamin A. They are synthetic (man-made) drugs that include acitretin (brand name Soriatane) and isotretinoin (Accutane). These are also useful for patients with acute pustular and erythrodermic psoriasis.

Biologics – A number of biologics are being studied for the treatment of psoriasis. These drugs target segments of the body's immune system.

- **Alefacept and Efalizumab:** Alefacept (brand name Amevive) and Efalizumab (brand name Raptiva) block the contact between surface receptors on T cells and on antigen presenting cells (APCs). Blocking these receptors prevents T cells from initiating a cascade of events between cells that leads to the formation of lesions on the skin.
- **Etanercept and Infliximab:** These drugs work against cellular protein messengers called cytokines. One of these cytokines, tumor necrosis factor-alpha (TNF), leads to increased inflammation and activation of T cells. Two therapies, etanercept (brand name Enbrel) and infliximab (brand name Remicade), block TNF-alpha and also treat psoriasis, according to studies. Enbrel is also approved to treat psoriatic arthritis.

In general, these drugs are reserved for the most severe cases of psoriasis, and are prescribed only after other treatment methods – including UV light therapy – have failed.

UV Phototherapy – UV Phototherapy involves exposing the skin to various wavelengths of ultraviolet light. The most common forms of UV Phototherapy are:

- **Sunlight** – Sunlight has been used for centuries as a source of UV radiation. However, its major disadvantage is that its emission spectra is highly variable, and contains a high proportion of UVA radiation. As a result, sunlight mainly has been replaced by artificial light sources for use in photomedicine.

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- UVB – Ultraviolet B radiation comprises the spectrum between 280 nm to 320 nm. It is the most biologically active portion of the solar spectrum, much more so (i.e. 1,000 times) than UVA radiation. The portion of the UVB spectrum that is known to be the action spectrum for psoriasis, is from 295 –315 nm.
- UVA – Ultraviolet A radiation comprises the spectrum from 320 nm to 390 nm. UVA typically is used in combination with psoralen, a photosensitizer. Thus the acronym “PUVA”. Due to the fact that PUVA treatments involve the use of a drug and ultraviolet light, PUVA typically is referred to as “photochemotherapy”. Psoralen may be administered topically, or by ingestion. Its maximal absorption is at 335 nm of UVA radiation, which is the optimal wavelength to maximize the efficiency of the psoriasis treatments. The exact mechanism of tissue interaction that makes PUVA effective in the treatment of psoriasis and other autoimmune diseases is not known. However, PUVA has been used for many years, and is of proven effectiveness.

## Hypopigmentation Primer

### What is hypopigmentation?

Hypopigmentation is whitening of the skin, resulting from the death of melanocytes, which are the cells that produce the skin pigment melanin.

### What is the difference between Leukoderma and Vitiligo?

Leukoderma is a general term for the loss of skin pigmentation. Vitiligo is one type/form of leukoderma. However, vitiligo is believed to be caused by an autoimmune disorder, while other forms of leukoderma are caused by skin trauma. As a result, practitioners commonly bracket hypopigmentation into two categories:

1. Leukoderma – hypopigmentation other than vitiligo; caused by skin trauma from stretching (e.g. stretch marks from pregnancy or dramatic weight fluctuations), scarring (e.g. acne scars; surgical scars), or as a latent adverse effect from laser-resurfacing or chemical peel procedures.
2. Vitiligo – a specific autoimmune disorder. The most common sites of pigment loss are body folds (such as the groin or armpits), around body openings and exposed areas like the face or hands. Vitiligo is common; in fact 1 to 2% of the general population has it. Its incidence is higher in people with thyroid conditions and some other metabolic diseases, but most people who have vitiligo are in good health and suffer no symptoms other than areas of pigment loss. Medical researchers are not sure what causes vitiligo. Some researchers think the body may develop an allergy to its pigment cells; others think that the cells may destroy themselves during the process of pigment production. [Source: National Vitiligo Foundation; web site address: [www.vitiligofoundation.org](http://www.vitiligofoundation.org)]

### Are vitiligo and other forms of leukoderma treated differently?

No. However, the main method of treating vitiligo prior to the year 2000 was using PUVA photochemotherapy. Subsequently, narrow band UVB has become the therapy of choice for moderate to severe disease. Narrow band UVB has several advantages over PUVA, including ease of treatment, and the lack of side effects or phototoxic reactions that are associated with oral and topical psoralen administration. A variety of drugs have been used to treat vitiligo, with limited success. Other procedures such as surgical grafting of skin to replace diseased tissue are performed. However, this is not commonly performed, and may be a treatment of last resort when the disease has not responded to alternate treatment therapies.

The treatment paradigm for vitiligo and other forms of leukoderma commonly involves exposure of affected skin to the highest dose of UVB that can be tolerated (i.e. without symptomatic erythema). Treatments are 2 or 3 times per week. After several treatments, the treated skin will tolerate a higher dose of UVB, and the dose is commonly increased by 15-20%.

## Principles of Phototherapy

### Key Terms:

- Action spectra – A measure of the biological response to exposure to varying wavelengths of light. The peak of the action spectrum defines the most effective wavelength. For UVB radiation, the action spectrum for the treatment of autoimmune diseases (e.g. psoriasis) is from 295 nm to 315 nm, with peak action at approximately 300 nm.
- Erythema – Skin reddening; is a reflection of the vascular response to UV radiation. Normally is a delayed response, with maximal reddening being 24 hours after UVB exposure, and 72 hours after UVA (PUVA) exposure. For UVB radiation, the shorter the wavelength, the greater the skin erythema response. For PUVA, peak erythema occurs at 335 nm, which is the absorption peak for psoralen. It is the most common end point used for evaluating the response of individuals to UV light. This is because the erythema action curve mimics the anti-psoriatic action curve within the UV spectra, i.e. the stronger the erythema, the stronger is the anti-psoriatic activity.
- MED – the Minimal Erythema Dose; is determined by exposing small patches of normal skin to different doses of UVB radiation. One MED is the exposure dose that elicits delayed erythema with four distinct borders, as observed at 24 hours. Note: One MED in psoriatic skin may be up to 4 times higher than that of normal skin, i.e. psoriatic skin can withstand a much higher dose of UVB radiation than can normal skin.
- MPD – the Minimal Phototoxic Dose; is determined by exposing small patches of skin to psoralen and different doses of UVA radiation. One MPD is the UVA exposure dose that elicits delayed erythema with four distinct borders, as observed at 72 hours. Note: One MPD in psoriatic skin may be up to 2 times higher than that of normal skin, i.e. psoriatic skin can withstand a much higher dose of UVA radiation than can normal skin.
- Phototesting – the process by which the patient’s Minimal Erythema Dose (UVB) or Minimal Phototoxic Dose (UVA) is determined. Involves exposure of individual skin patches to different (increasing) doses of UV radiation, and observation as to erythema response at 24 (UVB) or 72 (UVA) hours.
- Skin Type – a skin grading system (Type I – VI) used to characterize the patient’s tolerance to UV radiation. Is commonly used by the physician to set initial and subsequent doses of UV radiation to be used during conventional (booth) phototherapy.
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Skin Type	History	Examination
I	Always burns, never tans	
II	Always burns, sometimes tans	
III	Sometimes burns, always tans	
IV	Never burns, always tans	
V		Brown <sup>a</sup>
VI		Black

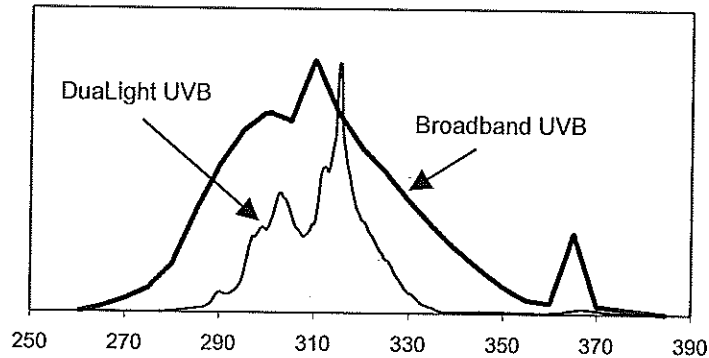
<sup>a</sup>Chinese, Mexican, American Indian

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## Targeting Light Therapy

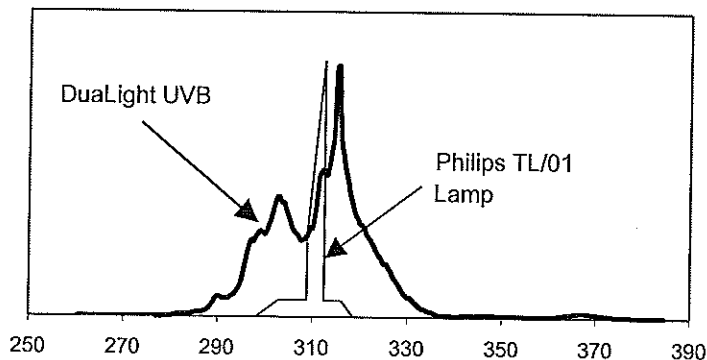
- UVB – the spectrum of electromagnetic radiation ranging from 280 nm to 320 nm.
  - Broadband UVB – The first artificial UVB light source developed for the treatment of psoriasis and other skin disorders. Is characterized by the broad spectra emitted. Generally is more erythematous and less effective than more recently developed “narrow-band” light sources. Contains significant energy in the spectra below 290 nm, which is highly erythematous, but minimally effective.

DuaLight UVB vs. Broadband UVB



- Narrow-Band UVB – A term used to describe artificial light sources, the spectra from which are from 295 nm to 315 nm. The first artificial narrow-band UVB light source is the Philips TL/01 lamp, the spectra from which ranges from 300 nm to 320 nm, with a peak at 311 nm. Over 90% of UVB emitted from the DuaLight system ranges from 295 nm to 315 nm. Perhaps more importantly, the mean erythemal wavelength – the product of power output at each nanometer of UVB and the erythemal value per watt of energy emitted – is 304 nm. As a result, in relation to autoimmune action spectra, by watt of energy emitted, DuaLight UVB will elicit more therapeutic action than that from other commercially available UVB light sources.

DuaLight UVB vs. Philips TL/01 UVB



- UVA – the spectrum of electromagnetic radiation ranging from 320 nm to 400 nm.

## **Traditional Phototherapy Equipment and Procedures**

The majority of phototherapy equipment in use today involves full-body cabinets or hand/foot units. The major suppliers of this equipment include:

- National Biological Corporation – view products at: [www.natbiocorp.com](http://www.natbiocorp.com)
- The Daavlin Company – view products at: [www.daavlin.com](http://www.daavlin.com)
- Amjo Corporation – view products at: [www.homephototherapy.com](http://www.homephototherapy.com)

The major disadvantage of this equipment is that both normal skin and diseased skin is exposed to UV light. Accordingly, the maximum dose that can be delivered during a single treatment session is limited to the dose that can be tolerated by the normal skin, i.e. <1 MED, or a “sub-erythema” dose. As a result, the cumulative dose that is required to bring the disease into remission must be delivered in numerous (25-30) treatment sessions.

Further, phototesting is inconvenient and involves the patient wearing specialized clothing with open ports to expose skin regions on the hip or buttocks. As a result, physicians frequently forgo phototesting, and opt to simply prescribe initial doses based upon patient Skin Type. This is a very imprecise method for determining initial dose setting.

Typical phototherapy treatment sessions last from several seconds (initial treatment session) to over 20 minutes. The number and duration of treatment sessions generally is inconvenient, and disruptive to a patient’s everyday schedule. As a result, patient compliance with the treatment schedule is an ongoing challenge.

## **Targeted Phototherapy Equipment and Procedures**

Targeted phototherapy allows the phototherapist to deliver UV light to isolated segments of skin disease. The major benefits of targeted phototherapy include:

- High doses of UV light can be delivered to reduce the total number of treatment sessions required
- Healthy skin is not exposed to UV light
- Ideal for the treatment of disease that traditionally is difficult to resolve using traditional light cabinet devices including:
  - Elbows, knees, feet, hands, nails, and scalp
  - Intertriginous areas (skin folds, groin area, under arms, under breasts)