

Here Comes the Sunburn: An Update

Urgent message: The advent of warmer weather is a reminder that many otherwise sensible Americans fail to heed warnings to use adequate protection from the sun. The urgent care clinician can expect to see more patients presenting with varying degrees of sunburn.

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Introduction

Sunburn is an acute cutaneous inflammation secondary to excessive exposure to solar ultraviolet (UV) radiation. About 30% to 40% of adults and 70% to 85% of children and adolescents in the United States experience an episode of sunburn every year.¹ It is estimated that 80% of a person's sun exposure occurs before the age of 21.²

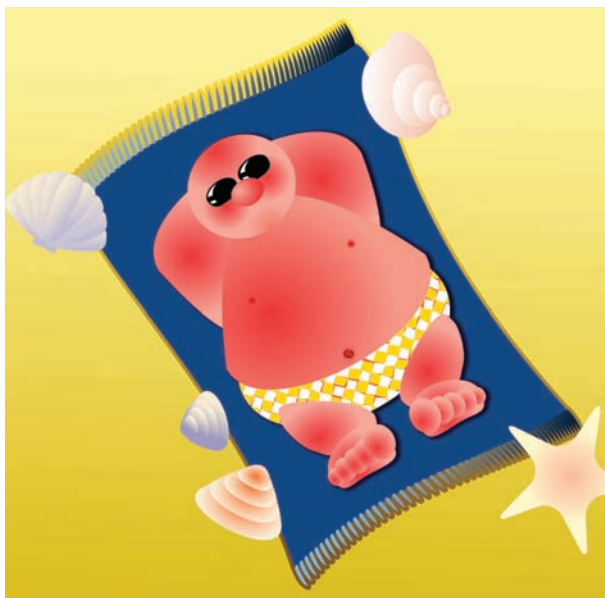
Hence, lifestyle modifications early in life play a crucial role in the prevention of sunburn and other, long-term, harmful effects of solar radiation.

In this article we provide updated information about sunburn's symptoms, pathogenesis, treatment, and prevention.

Pathogenesis

Solar UV rays can be classified into UV-A (340 nm to 400 nm) and UV-B (290 nm to 320 nm).

UV-B light is 1,000 times more erythemogenic than UV-A and can induce DNA mutagenesis; therefore, it is more



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damaging to the skin.

DNA damage, induction of p53, and generation of reactive oxygen species seem to be the major mechanisms of UV-B related skin damage.

Histologically, sunburn affects the stratum spinosum of skin epithelium. Dyskeratotic cells, also known as sunburn cells, are usually seen in this layer within 24 hours of exposure to UV light.

The pathogenesis of UV radiation related skin damage is summarized in **Figure 1**.

Risk Factors

The two major factors determining the development of sunburn are the amount and duration of exposure to sunlight and patient susceptibility.

Numerous environmental and biologic factors increase susceptibility to sunburn (**Table 1**). A history of sunburn, especially following low-intensity sunlight exposure, is a strong predictor of recurrent sunburn.

Contrary to popular belief, cloudy days are not associated with decreased risk of sunburn, as 80% of the UV

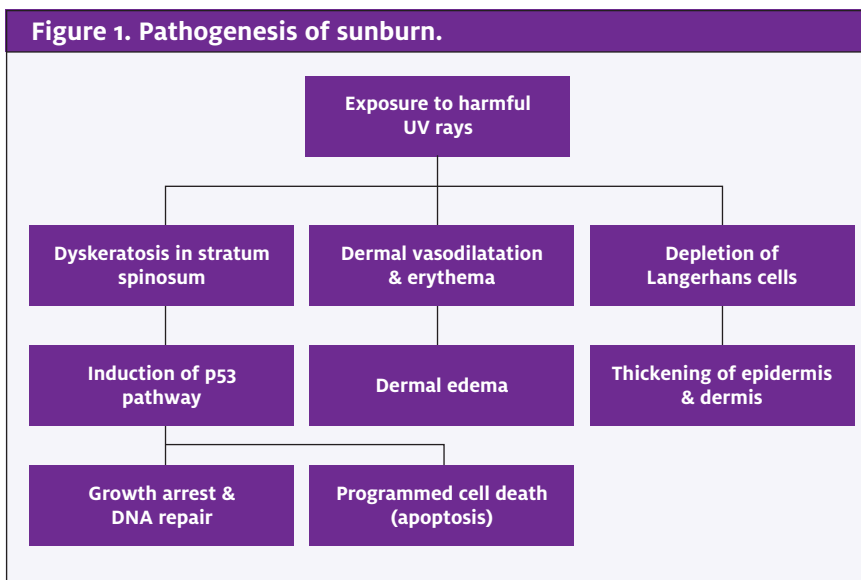


Table 1. Factors Increasing Susceptibility to Sunburn

Environmental	Biologic
<ul style="list-style-type: none"> • Proximity to equator or residence in sunbelts • High altitude • Amount of outdoor activity (occupational/recreational) • Use of photosensitizing medications <ul style="list-style-type: none"> – Retin A – Psoralens – Antihistamines – Oral contraceptives – Sulfas – Tetracyclines – NSAIDs – Anticonvulsants – Furosemide – Thiazides 	<ul style="list-style-type: none"> • Caucasian ethnicity • Light hair and eyes

rays can penetrate the clouds. In addition, for every 100 feet above sea level, radiation increases 4% to 5%.²

A simple classification of skin phototypes based on response to initial sun exposure proposed by Fitzpatrick is depicted in **Table 2**.³

Clinical Manifestations and Diagnosis

Clinical manifestations of sunburn can range from painless erythema to blistering and second-degree burns (**Fig-**

ure 2 and Figure 3).

Common complaints include pain, redness, burning, blistering, and swelling. Physical signs include erythema, warmth, tenderness, edema, and blistering. Erythema develops three to four hours after exposure and peaks around 12 to 24 hours. Scaling and desquamation are late signs and are often noted four to seven days after exposure. Diagnosis is usually based on history of exposure to sunlight, typical symptoms, and the characteristic appearance of sun-exposed skin.⁴

Prevention

The following measures may help prevent sunburn and other undesirable effects of sunlight (i.e., photoaging, actinic keratosis, and dermatologic malignancies such as melanoma and basal cell carcinoma).²

1. Avoidance. Avoiding direct exposure to sunlight, especially during summer between 10 a.m. and 4 p.m. Patients should be educated that cloudy days offer no protection against harmful UV radiation.

2. Sun-protective clothing. Clothing filters out the sun’s rays. Covering up with a wide brimmed hat, sunglasses with appropriate sun blockade, and wearing loose-fitting clothing with long sleeves provide sun protection.

Summer clothing usually provides limited protection because of the looseness of the weave, typically ranging from 2 to 6.5 Sun Protection Factor (SPF); SPF estimates the protection offered by clothing or sunscreen or sunblock against sunburn. Synthetic materials used in sun-protective garments have tighter-woven fabric and provide greater protection. These specialized garments demonstrate high solar protection in studies despite color or moisture content.^{2,5}

3. Sunscreens. The current gold standard for photo protection is sunscreen.² If an individual develops erythema after 10 minutes of direct sun exposure, the use of SPF 15 sunscreen would prevent erythema from a similar intensity exposure of about 150 minutes. Sunscreens are classified as either physical/inorganic or chemical/organic sunscreens.

Physical sunscreens contain inert minerals such as titanium dioxide, zinc oxide, or talc and work by reflecting UV-A and UV-B rays away from the skin. Aestheti-

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Table 2. Skin Phototypes

Skin type	Description	Skin color	Recommended SPF for outdoor activity
I	Always burns, never tans	White	25-30
II	Always burns, tans minimally	White	25-30
III	Burns minimally, tans slowly	White	15
IV	Burns minimally, tans well	Olive	15
V	Rarely burns, tans profusely/darkly	Brown	15
VI	Rarely burns, always tans	Black	15

cally unappealing qualities limit their use.

Chemical sunscreens are sub-classified based on their ability to absorb UV-A, UV-B, or both. **Table 3** lists the various chemicals used in sunscreens, as well as their spectrum of protection.⁶ Most sunscreens available today have a combination of UV-A and UV-B protective chemicals.

Choosing an appropriate sunscreen from the wide array of products is challenging. Certain products have received a Seal of Recommendation from the Skin Cancer Foundation, awarded to products that have proven to safely and sufficiently “aid in the prevention of sun-induced damage to the skin.”⁷ A minimum SPF of 15 for adults and 25 for children is recommended.

Use of sunscreens in children <6 months of age is not recommended.⁸

Products with an SPF above 30 offer little additional benefit and may expose the individual to potentially harmful levels of chemicals.^{2,6,8}

Uniform and proper application of an appropriate sunscreen is essential to achieve full benefits and is outlined in **Table 4**.⁸

Treatment

Symptomatic therapy is the mainstay of management of acute sunburns. A number of treatments aimed at altering the course of sunburn have been explored, but no conclusive evidence supporting their use exists at present.⁹

NSAIDs

The use of NSAIDs has been studied in the treatment of sunburn. Both topical (e.g., diclofenac 0.1% gel) and oral NSAIDs have been shown to decrease erythema and pain. However, the beneficial effects, especially of topical preparations, decrease after the initial 24 hours.

Corticosteroids

Although corticosteroids have anti-inflammatory effects, neither topical nor systemic use has been shown to effect clinical improvement compared with placebo.⁹ Similarly, prednisone 80 mg given 24 hours before exposure has not been shown to improve symptoms when compared with placebo.

Combining topical corticosteroids with oral NSAIDs has been shown to be more efficacious than either agent alone.

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Figure 2. 10-year-old boy with sunburn.



Figure 3. 60-year-old female with sunburn on exposed areas only.

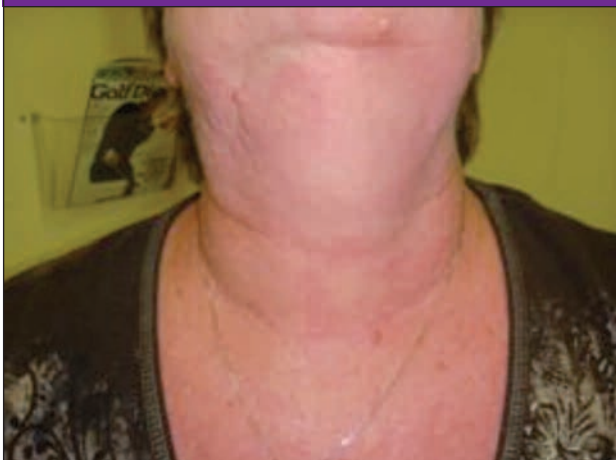


Table 3. Active Ingredients in Sunscreens

UV-A absorbers	UV-B absorbers	UV-A & UV-B absorbers
Dibenzoylmethanes	<ul style="list-style-type: none"> • Cinnamates • Camphor derivatives • Para-amino benzoate (PABA) derivatives • Salicylates 	<ul style="list-style-type: none"> • Benzophenones • Triazoles

Table 4. Appropriate Use of Sunscreens

Correct use	Incorrect use
<ul style="list-style-type: none"> • Liberal uniform film of sunscreen • Apply 15 minutes before sun exposure • Apply adequate amount (30 ml or 1 oz./body application) • Reapply twice hourly and after swimming/heavy sweating 	<ul style="list-style-type: none"> • Applied too thinly or rubbed too vigorously • Using sunscreen to prolong time in sun • Inadequate SPF

sleeved shirt, and long pants made of closely woven fabrics.

- Use a sunscreen with an SPF of 15 to 30 for children over 6 months of age and for adults.
- Wear sunglasses that protect from UV-A and UV-B light.
- Beware of reflected light from sand, cement, water, and snow.
- Be more careful at high altitudes.
- Avoid the sun if you are taking certain medications or have a condition that makes you photosensitive.
- The only treatment currently recommended is symptomatic. ■

Emollients

Limited data exist on the use of emollients after sunburn.

Antioxidants

The role of antioxidants in prevention and treatment of sunburn remains questionable. No definitive evidence exists to justify the widespread use of substances such as vitamins, melatonin, or thiamazole for erythema due to sun exposure.⁹

Summary of Recommendations

The following constitutes a basic guide for patients (and providers) wishing to avoid excessive exposure to solar UV radiation.

- Avoid the sun, especially between 10 a.m. and 4 p.m.
- Wear protective clothing, including a hat, long-

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