Sunscreen is perhaps the best weapon available in the fight against skin cancer and premature aging. A single overexposure to sunlight can cause painful redness, and severe burns can increase the risk of developing skin cancer later in life. Prolonged overexposure may cause skin cancer, wrinkles, freckles, age spots, and changes in the skin’s texture. Patients should be counseled on the importance of using sunscreen, as well as how to attain optimal protection.

Ultraviolet Radiation
Ultraviolet (UV) radiation is a known carcinogen. The two types of UV radiation that affect the skin are known as ultraviolet A (UVA) and ultraviolet B (UVB). Both have been linked to skin cancer and an overall weakening of the immune system. UVB rays mostly affect the surface of the skin and are the primary cause of sunburn. Overexposure to UVB causes cellular damage in the basal and squamous layers of the skin, and is the main cause of basal-cell and squamous-cell carcinomas. UVA rays penetrate more deeply into the skin, affecting the melanocytes, and are implicated in the development of the third main type of skin cancer, melanoma.

Mechanism of Action and Sun Protection Factor
Sunscreens work by absorbing, reflecting, or scattering UVA and UVB rays on the skin. Based on their mechanism of action, topical sunscreens are generally classified into two groups, chemical absorbers and physical blockers. Chemical absorbers work by absorbing UV radiation, while physical blockers work by reflecting or scattering the UV radiation. Chemical absorbers may provide protection from UVA, UVB, or both. Broad-spectrum sunscreens contain ingredients that absorb both UVA and UVB radiation and are highly recommended by the American Academy of Dermatology. Studies also show that broad-spectrum sunscreens offer protection against sunlight-induced immunosuppression.

Sunscreens come in several different forms, including ointments, creams, gels, lotions, sprays, and wax sticks. The FDA requires that all types of sunscreen come labeled with a sun protection factor (SPF) indicator. The SPF refers to the amount of sunburn protection the product provides with correct use. It is important to note that SPF indicators only refer to sunburn protection, which is caused by UVB exposure. Many sunscreens also protect against UVA radiation, but this will not be reflected in the SPF.
number, and a high SPF product may actually provide very little UVA protection. The American Academy of Dermatology recommends broad-spectrum products with a minimum SPF of 15. An SPF 15 product protects the skin from about 93 percent of UVB radiation, while an SPF 30 provides around 97 percent protection.1

Common Excipients

Chemical agents commonly used in sunscreens typically fall into one of four drug classes: (1) aminobenzoic acid derivatives, (2) benzophenones, (3) cinnamates, and (4) salicylates. They offer varying levels of UVA and/or UVB protection.

Aminobenzoic Acid Derivatives

- Para-aminobenzoic acid (PABA): Absorbs UBV radiation only
- Padimate O: Extensive UVB protection
- Menthol anthranilate: Extensive UVB protection, partial UVA protection

Benzophenones

- Avobenzone: Extensive UVA protection, limited UVB absorption
- Dibenzobenzozene and Oxbenzone: Partial UVA protection, extensive UVB absorption
- Salisulbenzone: Absorbs most UVB radiation, some UVA radiation

Cinnamates

- Cinoxate: Provides limited UVA protection, extensive UVB coverage
- Octocrylene and Octyl methoxycinnamate: Extensive UVB protection, limited UVA

Salicylates

- Homosalate and Octyl salicylate: UBV absorption only
- Trolamine salicylate: Provides extensive UVB protection

Physical Blockers

Physical blockers offer more complete protection, but are thick, opaque, and greasy preparations as opposed to most chemical sunscreens, which dry clear. Red petals, titanium dioxide, and zinc oxide are physical blockers, and all offer excellent protection from UVA and UVB radiation. Physical blockers such as these have the added benefit of being highly water-resistant. A combination sunscreen that includes both physical blocking agents and broad-spectrum chemical absorbers offers the most complete protection.

Proper Use

While SPF indicators offer a guideline as to the amount of sunburn protection, it is important for patients to use the product correctly, with consideration to skin type and activity level. Without proper application, SPF levels will be much lower than what the labeling indicates. To ensure the full SPF benefit, patients should apply a full ounce to uncovered areas approximately thirty minutes before sun exposure to allow the ingredients to bind to the skin. The same amount should be reapplied approximately every 2 hours, or immediately after swimming or heavy sweating. Studies indicate that typical users apply only one quarter to one half the amount they should be applying, with insufficient reaplication.1

Skin type must also be considered when recommending a sunscreen product. Other factors, such as the patient’s occupation, compliance, geographic location, duration of exposure, and any history of skin cancer or precancerous changes should also be taken into consideration.1

- Skin Type I burns easily, rarely tans, usually pale skin color: Minimize sun exposure, choose broad-spectrum sunscreen with a minimum SPF of 20 to 30.
- Skin Type II often burns and tans minimally: Recommend broad-spectrum products with SPF of 12 to 20.
- Skin Type III burns moderately, but gradually tans: Recommend products with SPF of 8 to 15.
- Skin Type IV burns minimally and tans well: Recommend products with SPF of 4 to 12.
- Skin Type V rarely burns and tans profusely to dark brown: Recommend sunscreens with a minimum SPF of 2 to 8.
- Skin Type VI never burns and is deeply pigmented naturally: Recommend light protection.

Formulations

For patients with a history of skin cancer, immune disorders, or those who have Skin types I or II and an elevated risk of sun damage, custom formulations can significantly minimize exposure. Broad-spectrum sunscreen compounds can be tailored to the individual needs of the patient and adjusted as necessary.

Providing patients with a thorough understanding of UV radiation and its effects, as well as sunscreen and its properties and mechanism of action, is key in the fight against skin cancer. Counseling patients on choosing a sunscreen product and proper application can go a long way in preventing the many negative effects of sun exposure.

Use of Sunscreens in the Pediatric Population

Sunscreens are not recommended for infants less than 6 months of age, mainly because of the controversy over the possible risk of different absorption, metabolism, and excretion of drugs in the infant population.1 The skin of infants is thinner than the skin of older children and more sensitive to the sun. Infants in this age group should be kept out of the sun.

Children and infants who are 6 months of age and older should use sunscreens that contain an SPF of 15 or higher. Fair-skinned children (with red or blond hair) need a sunscreen with an SPF of 30. Take precautions to avoid applying sunscreen on areas where an infant may lick it off.

A pediatrician or healthcare professional should be consulted regarding the use of sunscreens in children.2

WARNING: While using sunscreens, caution should be exercised when using topical insect repellants containing diethyltoluamide (DEET). Sunscreens may increase the absorption of DEET into the skin. This is especially important in children.

References