
Photoprotection in specific populations: Children and people of color



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Improved education on appropriate photoprotection in children is vital. Photoprotection for these individuals should include seeking shade, the use of physical agents (clothing, hat, sunglasses), and application of sunscreens on exposed areas. Avoidance of the use of tanning beds is an important component of education for teenagers. Ultraviolet radiation exposure induces DNA damage and photoaging in all skin types, including people of color. The extent of such damage is inversely related to constitutive skin pigmentation. Therefore, personalized photoprotection recommendations concerning skin cancer risk factors, desired treatment outcomes, health needs (eg, vitamin D), and photoaging based on the needs and preferences of the patient are essential. It is clear that additional research is needed on optimal levels of protection against ultraviolet radiation for people of color. (*J Am Acad Dermatol* 2017;76:S110-21.)

Key words: children; people of color; photoprotection; tanning beds.

Guidelines for photoprotection and sun exposure recommend that everyone protects their skin from solar ultraviolet (UV) radiation (UVR) exposure by seeking shade, wearing sun-protective clothing, and using a sunscreen with a sun-protection factor (SPF) of at least 30. However, because the understanding of risk from UVR exposure is not consistent among all individuals, and there is a belief by some dark-skinned individuals that photoprotection is not essential, it is clear that more specific guidance and education about photoprotection are needed. Two of these special populations are children (aged ≤ 18 years)¹ and people of color (POC). For the latter, data on the effects of UVR exposure are limited. The purpose of this article is to highlight the distinctive aspects of photoprotection practice and education in children and in POC.

CHILDREN

Solar radiation has more pronounced biologic effects on the skin of children compared with adults.

Abbreviations used:

25(OH)D:	25-hydroxyvitamin D
AAD:	American Academy of Dermatology
ACD:	Australasian College of Dermatologists
CPD:	cyclobutane pyrimidine dimer
MED:	minimal erythema dose
POC:	people of color
PP:	pyrimidine-pyrimidine photoproducts
SPF:	sun-protection factor
UV:	ultraviolet
UVR:	ultraviolet radiation

Children's skin, particularly up to age 3 years, has a lower concentration of protective melanin and a thinner stratum corneum.^{2,3} This allows UVR to penetrate deeper, resulting in photodamage. Because the epidermis of very young children is thin, UVR can easily reach dermal papillae and the dermal capillaries, which may promote photoimmunosuppression. In addition, the basal cell layer is relatively rich in stem cells, which are susceptible to

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UVR-induced mutagenesis. Despite these properties, however, the minimal erythemal dose (MED) to UVB in children has been shown to be similar to that of adults.⁴

In contrast, infants' skin develops sunburn more easily than that of adults because the skin of infants is thinner and has an increased rate of percutaneous absorption and transepidermal water loss.⁵ In newborns, the ability to develop pigmentation (tanning) after UVR exposure has been demonstrated to occur within the first months (30-45 days) of life.⁶ The increased vulnerability of the skin of children to the effects of UVR exposure indicates that children and their parents need to be properly educated on photoprotection. It should be noted that photodamage can occur in children of all skin types.

UVR exposure during childhood is a critical period for the increase in skin cancer risk later in life.⁷⁻⁹ A meta-analysis of 51 studies concluded that "ever" having a sunburn during childhood almost doubles the risk for the development of cutaneous melanoma in adulthood.¹⁰ Studies in immigrants to Australia showed that moving within the first 10 years of life to regions with more intense UVR results in an elevated risk of developing melanoma and nonmelanoma skin cancer to levels similar to those in inhabitants born in Australia; in contrast, moving later in life is associated with a lower risk compared with those born in Australia.^{3,11,12} Among indoor tanning bed users, higher risk for the development of basal cell carcinoma was observed in those who started using tanning beds in high school or college, compared with those who started at 25 to 35 years of age.¹³ It has been calculated that regular use of sunscreen with an SPF of 15 during the first 18 years of life would reduce the lifetime incidence of basal and squamous cell carcinomas of the skin by 78%.¹⁴ Even repeated suberythemal doses of UVR are capable of producing long-term effects that are preventable with use of medium SPF sunscreen.¹⁵

Among US children, the incidence of sunburn is high: 29% to 83% over the entire summer season, and 7% to 13% over any summer weekend.¹⁶⁻¹⁸ In 2010, approximately one third of US teens aged 14 to 17 years reported having had a sunburn during the

preceding 12 months.¹⁹ According to a review of 29 studies from Australia, Europe, Japan, Mexico, the United Kingdom, and the United States, children and adolescents spend a mean of 1.5 to 5.1 hours outdoors daily.²⁰ It has been estimated that by 18 to 20 years of age, everyone will have received 40% to 50% of their cumulative UVR exposure up to age 60 years.²¹ Thus, preventing erythema and sunburn in childhood should help to minimize the development of photodamage and photocarcinogenesis later in life.

Photoprotection

The most important strategy for photoprotection for children is behavioral modifications related to sun exposure. Approaches based on physical protection, such as shade, clothing, hats, and sunglasses, represent the best and least expensive photoprotection strategies.²²

A strong body of evidence indicates that in adults, the use of sunscreens reduces the incidence of premalignant lesions (actinic keratoses), malignant lesions (squamous cell carcinomas), photoaging (solar elastosis), and even viral infections (herpes labialis) (see Young et al, this supplement). A number of studies in children have shown that use of sunscreens can prevent the development of melanocytic nevi, which is strongly associated with the development of cutaneous melanoma.²³⁻²⁷ It is important to note that the use of sunscreens is intended to minimize UV-induced damage to the skin; it should not be regarded as a means of increasing the duration of sun exposure.

For children aged 6 months and older, current guidelines recommend a broad-spectrum, water-resistant sunscreen with an SPF 30 or higher, ideally with a predominance of inorganic (ie, physical) filters (zinc oxide or titanium dioxide, which cause less irritation to sensitive skin).²⁸⁻³⁰ Ideal sunscreen products for children should have broad-spectrum UVR coverage and good photostability, dispersibility, and aesthetics. They should be water resistant, and have low potential for irritation to the skin and eyes. Sunscreen should be applied in adequate amounts (2 mg/cm²) covering all exposed skin surfaces, paying special attention to areas such as the ears, neck, and the backs of the hands. It should be applied 20 minutes before sun exposure, and reapplied approximately every 2 hours when

CAPSULE SUMMARY

- Photoprotection in children includes seeking shade, the use of physical agents, application of sunscreens on exposed areas, and avoidance of the use of tanning beds. Education of peers and parents are essential.
- Although more research is needed, photoprotection for people of color would ideally involve personalized recommendations taking into account the preferences of the patient and the risk factors for photocarcinogenesis and photoaging.

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