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Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of all Children

Policy Statement—Ultraviolet Radiation: A Hazard to Children and Adolescents

abstract

FREE

Ultraviolet radiation (UVR) causes the 3 major forms of skin cancer: basal cell carcinoma; squamous cell carcinoma; and cutaneous malignant melanoma. Public awareness of the risk is not optimal, overall compliance with sun protection is inconsistent, and melanoma rates continue to rise. The risk of skin cancer increases when people overexpose themselves to sun and intentionally expose themselves to artificial sources of UVR. Yet, people continue to sunburn, and teenagers and adults alike remain frequent visitors to tanning parlors. Pediatricians should provide advice about UVR exposure during health-supervision visits and at other relevant times. Advice includes avoiding sunburning, wearing clothing and hats, timing activities (when possible) before or after periods of peak sun exposure, wearing protective sunglasses, and applying and reapplying sunscreen. Advice should be framed in the context of promoting outdoor physical activity. Adolescents should be strongly discouraged from visiting tanning parlors. Sun exposure and vitamin D status are intertwined. Cutaneous vitamin D production requires sunlight exposure, and many factors, such as skin pigmentation, season, and time of day, complicate efficiency of cutaneous vitamin D production that results from sun exposure. Adequate vitamin D is needed for bone health. Accumulating information suggests a beneficial influence of vitamin D on many health conditions. Although vitamin D is available through the diet, supplements, and incidental sun exposure, many children have low vitamin D concentrations. Ensuring vitamin D adequacy while promoting sun-protection strategies will require renewed attention to children's use of dietary and supplemental vitamin D. *Pediatrics* 2011;127:588–597

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KEY WORDS

sun, ultraviolet radiation, children, skin cancer, skin cancer prevention, melanoma, vitamin D, prevention, sun protection, sunscreen, tanning, artificial tanning

ABBREVIATIONS

UVR—ultraviolet radiation
NMSC—nonmelanoma skin cancer
BCC—basal cell carcinoma
SCC—squamous cell carcinoma
SPF—sun-protection factor
25(OH)D—25-hydroxyvitamin D

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BACKGROUND

Sunlight sustains life on earth. The sun provides warmth, is needed for photosynthesis, drives biorhythms, and promotes feelings of well-being, and sunlight is essential for vitamin D synthesis in skin.

The sun emits ultraviolet ("above violet") radiation (UVR) waves that range from 200 to 400 nm. UVB (290–320 nm) and UVA (320–400 nm) rays penetrate the atmosphere and have the greatest biological significance. Solar radiation that reaches the earth's surface comprises approximately 95% UVA and 5% UVB rays.[1]

Sand, snow, concrete, and water can reflect up to 85% of sunlight, thus intensifying exposure.[2] UVR can penetrate to a depth of 60 cm in water and result in significant exposure. UVA rays are relatively constant throughout the day and the year. UVB rays have greater intensity in summer than in winter, at midday than in morning or late afternoon, in

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places closer to the equator, and at high altitudes. UVR can be produced by man-made lamps (eg, sunlamps) and tools (eg, welding tools).

UVR EFFECTS ON THE SKIN

Erythema and sunburn are acute reactions to excessive amounts of UVR. The minimal erythema (or erythemal) dose (the amount of UVR exposure that will cause minimal erythema or slight pinkness of the skin) depends on factors such as skin type and thickness, the amount of melanin in the epidermis and its capacity to produce melanin after sun exposure, and the intensity of the radiation. Tanning is a protective response to sun exposure.[3] Skin aging is the result of chronic unprotected exposure to UVR, which weakens the skin's elasticity and results in sagging cheeks, deeper facial wrinkles, and skin discoloration later in life.

Chemical photosensitivity refers to an adverse cutaneous reaction that results when certain chemicals or drugs are applied topically or taken systemically at the same time that a person is exposed to UVR or visible radiation. The reaction can occur on first exposure to an agent (phototoxicity) or can be an acquired altered reactivity of the skin (photoallergy), usually triggered by exposure to UVA rays, that depends on antigen-antibody or cell-mediated hypersensitivity. Drugs associated with phototoxic reactions include those commonly used by adolescents, such as nonsteroidal anti-inflammatory agents, tetracyclines, and tretinoin; other medications such as phenothiazines, psoralens, sulfonamides, and thiazides; and para-amino benzoic acid (PABA) esters.[4] Sunscreens, fragrances, sulfonamides, and phenothiazines are associated with photoallergy. Many commonly used medications and furocoumarins in plants[5] have photosensitizing properties. Up to 80% of patients with lupus erythematosus have photosensitivity. The threshold ultraviolet dose that triggers reactions is much lower than that for sunburn in these people, and the latency period is between several days and 3 weeks.[6]

Nonmelanoma skin cancer (NMSC) includes basal cell carcinoma (BCC) and squamous cell carcinoma (SCC). In US adults, NMSC is the most common malignant neoplasm, with more than 2 million cases diagnosed each year. Most of these are BCC; SCC occurs less often.[7] NMSC is rarely fatal.[7] NMSC occurs in maximally sun-exposed areas of fair-skinned people and is uncommon in black people. NMSC is rare in children in the absence of predisposing conditions.[8] The incidence of NMSC is increasing in young adults.[9] Sun exposure is the main environmental cause of NMSC; in SCC, cumulative exposure over long periods, resulting in photodamage, is considered important in pathogenesis.

Likewise, the incidence of melanoma continues to increase. Melanoma incidence has been increasing for at least 30 years. Most recently, rapid increases have occured in young white women (3.0% per year since 1992 in ages 15 to 39 years) and white adults older than 65 years.[10] Melanoma represents less than 5% of all skin cancers but causes the most skin cancer deaths. Melanoma can occur in teenagers and young adults; it is the second most common cancer of women in their 20s and the third most common cancer of men in their 20s.[11] Possible factors that contribute to the increased incidence of melanoma include the decrease in the earth's protective ozone layer, changing patterns of dress that favor more skin exposure, more opportunities for leisure activities in sunny areas, and increased exposure to artificial sources of UVR for tanning purposes. If detected when the tumor is thin and small, melanoma has an excellent prognosis. However, metastatic melanoma has no successful treatment options. Prevention and early detection, therefore, are crucial in this disease.

People at highest risk of melanoma have light skin and eyes and sunburn easily. Risk of developing melanoma is increased for people with a first-degree relative who has had melanoma or those with a personal history of previous melanoma. Those who freckle easily and those with a large number of typical or atypical moles (high nevus count) are also at higher risk of cutaneous malignancy. People with xeroderma pigmentosum (a condition in which there is a genetically determined defect in the repair of DNA damaged by UVR) and related disorders are at increased risk of melanoma.

Melanoma is rare in children but can occur. Characteristics of a child's melanoma lesion may differ from those typically found in adults; a child's lesion may be amelanotic (pink, pink-white, or red), may be raised, and may have regular borders. The key to diagnosis of melanoma in children is often the recognition that the lesion is unlike any other lesions on the child.[12]

EVIDENCE THAT UVR CAUSES SKIN CANCER

In 1992, the International Agency for Research on Cancer concluded that "there is sufficient evidence in humans for the carcinogenicity of solar radiation."[1] Since that time, additional research results have supported a strong causal relationship between sunlight exposure and skin cancer. Evidence comes from cellular, biological, and epidemiologic studies. Epidemiologic evidence includes relationship of high ambient solar UVR with higher rates of BCC and SCC[13]; relationship of BCC, SCC, and melanoma rates to race

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and pigmentation[7,14]; increased frequency of skin cancers with higher sun-exposure history[15] or artificial UVR exposures from sunbeds or sunlamps[16]; heightened risk of melanoma for those with increased childhood sun-exposure history[17]; and relationship between sun exposure and increasing number of nevi, which may predispose to melanoma. Exposure to UVR contributes to immunosuppression, which is increasingly recognized as important in the development of skin cancer.[18,19]

UVR EFFECTS ON THE EYE

In adults, most UVR (>99%) is absorbed by the anterior structure of the eye, although some reaches the retina.[20] Acute exposure to UVR can result in photokeratitis.[21] Gazing directly into the sun can cause focal burns to the retina (solar retinopathy).[22] Long-term exposure to UVB is associated with an increased risk of cortical and posterior subcapsular cataracts.[23] UVR can contribute to the development of pterygium, corneal degenerative changes, and cancer of the skin around the eye.[20] There is evidence for a probable relationship between UVR exposure and squamous intraepithelial neoplasms of the conjunctiva or cornea.[24]

ARTIFICIAL SOURCES OF UVR

Sunlamps and tanning beds are the main sources of deliberate artificial UVR exposures.[16] The intensity of UVA radiation produced by large, powerful tanning units may be 10 to 15 times higher than that of the midday sun.[25]

Artificial tanning is a common practice among teenagers. Use of a tanning facility at least once in their lives was reported by 24% of non-Hispanic white teenagers 13 to 19 years of age in a US sample.[26] In another national survey, 10% of youths 11 to 18 years of age reported using indoor tanning sunlamps in the previous year.[27] Women and girls constitute the majority of people who artificially tan.[28]

Artificial UVR exposure causes acute effects such as erythema and sunburn. Other frequently reported effects include skin dryness, pruritus, nausea, photodrug reactions, disease exacerbation (eg, systemic lupus erythematosus), and disease induction (eg, polymorphous light eruption). Long-term health effects include skin-aging, effects on the eyes, and carcinogenesis. Use of tanning devices has been associated with an increased incidence of SCC and BCC[16,29] and melanoma.[30]

One commonly held misconception is that a "prevacation tan"—obtained when people visit tanning salons to prepare skin for a sunny vacation—protects against subsequent skin damage. This practice actually leads to extra radiation exposure not only before the vacation but also afterward, because people use fewer sun-protection precautions during the vacation, believing mistakenly that the tan will protect them.[28] A prevacation tan results in minimal protection (a sun-protection factor [SPF] of 3)[25] and affords virtually no protection against sun-induced DNA damage.[16] The evidence does not support a protective effect of the use of tanning beds against damage to the skin from subsequent sun exposure.[16]

The World Health Organization, the American Medical Association, and the American Academy of Dermatology all support legislation to ban the use of artificial tanning devices by people younger than 18 years. In a review, the International Agency for Research on Cancer concluded that young adults should be discouraged from using indoor tanning equipment and that restricted access to tanning beds and sunlamps by minors should be strongly considered.[16] Currently, more than 60% of US states regulate tanning facilities for minors, and regulatory efforts are increasing.[31] Legislative efforts focus on age limitations and written-consent processes. The tanning industry has fought vigorously to allow teenagers access to tanning salons.[32,33]

Artificial "sunless" tanning with spray products in salons or with self-applied products has been advocated by some organizations as an alternative to tanning through exposure to natural or artificial UVR. A survey of young adults 18 to 24 years of age in the United States revealed that 22% had used sunless tanners in the previous 12 months, and another 22% who had not used these products would consider doing so in the next 12 months.[34] Because most sunless tanners do not afford any significant ultraviolet protection, consumers must be advised that sunburn and sun damage may occur unless they use sunscreen and other sun-protection methods. Consumers must also be warned that sunless tanning products that contain added sunscreen provide UVR protection for a few hours after application but that additional protection from the sun must be used during the duration of the artificial tan.

PREVENTION

Leading organizations have recommended a comprehensive set of sun-safe behaviors.[35–37]

UVR-protective messages include the following:

1. Do not burn; avoid suntanning and tanning beds.
2. Wear protective clothing and hats.
3. Seek shade.
4. Use extra caution near water, snow, and sand.
5. Apply sunscreen.
6. Wear sunglasses.

Clothing can be an excellent UVR barrier. In contrast to sunscreen, the photoprotection afforded by clothing does

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not diminish throughout the day unless the clothing becomes wet. Clothes that cover more of the body provide more protection; sun-protective styles cover to the neck, elbows, and knees. Wool and synthetic materials, thickly woven fabrics, darker colors, and tightly woven fabrics with chemical enhancement have higher protective values than do corresponding counterparts.[38] The ultraviolet protection factor (UPF) is a system used to rate a fabric's ability to block UVR from passing through the fabric and reaching the skin. The UPF value can be from 15 to ≥50 and is classified as follows: 15 to 24 is rated as "good" UV protection; 25 to 39 is rated as "very good"; and 40 to ≥50 is rated as "excellent."

Seeking shade is somewhat useful, but people can still sunburn, because light is scattered and reflected. A fair-skinned person sitting under a tree can burn in less than an hour. Clouds decrease UVR intensity but not to the same extent that they decrease heat intensity and, thus, may promote a misperception of protection.[39]

Sunscreen is the main form of protection used by the population.[40–43] Sunscreens reduce the intensity of UVR affecting the epidermis, thus preventing erythema and sunburn. Many sunscreen agents approved by the US Food and Drug Administration are organic chemicals that absorb various wavelengths of UVR, primarily in the UVB range; many are also effective in the UVA range.[44] Some agents are not photostable in the UVA range and degrade with sun exposure, so combinations of chemicals are used to enhance protective effects.[45] The 2 inorganic physical sunscreens approved by the US Food and Drug Administration are zinc oxide and titanium dioxide. These sunscreens prevent penetration of skin by UVB and UVA. Infrequently, topical sunscreen agents (especially chemical screening agents) can have adverse effects, including erythema, itching, burning, or stinging. Allergic contact dermatitis and photoallergic and phototoxic reactions occur rarely.[44]

SPF is a grading system that was developed to quantify the degree of protection from erythema provided by using a sunscreen; the higher the SPF, the greater the protection. For example, a person who would normally experience sunburn in 10 minutes can be protected for approximately 150 minutes (10 × 15) with an SPF-15 sunscreen. SPF pertains only to UVB. Sunscreens do not completely block UVB; for example, an SPF-15 sunscreen will allow approximately one-fifteenth or 6% of UVB photons to penetrate the skin.

In actual use, SPF often is substantially lower than expected because the amount applied to the skin is less than that recommended (2 mg/cm^2).[45] To adequately cover all sun-exposed areas of an average adult wearing a bathing suit, 1 oz (30 mL) of sunscreen would be needed. It is recommended that sunscreen with an SPF of at least 15 be applied liberally 15 to 30 minutes before sun exposure to allow for absorption into the skin and to decrease the likelihood that the sunscreen will be washed off. Furthermore, it is recommended that sunscreens be reapplied every 2 hours and after swimming, sweating, or drying off with a towel.[44] Sunscreen products with a higher SPF provide somewhat greater protection. Products with a higher SPF have been recommended for some people including those who have had skin cancer.[46] For most users, however, proper application and reapplication are more important factors than using a product with a higher SPF.

The regular use of a broad-spectrum sunscreen preparation can prevent solar (actinic) keratoses, which are precursor lesions of SCC.[47,48] One randomized clinical trial revealed that sunscreen also decreases the risk of developing SCC.[49] However, some research has shown that sunscreen users have a higher risk of melanoma and BCC and have more nevi.[50] These observations have led to concerns that people who use sunscreens spend more time in the sun.[51] Two meta-analyses, however, demonstrated that after controlling for skin type and exposure, sunscreen users do not have a higher risk of melanoma.[52,53] No studies have demonstrated that sunscreen use prevents melanoma or BCC. Sunscreen continues to be recommended by the American Academy of Dermatology[54] and many other organizations as part of a total program of protection from the sun.

Sunscreens may be systemically absorbed. In urine samples of a representative sample of the US population older than 6 years, oxybenzone, a commonly used sunscreen agent, was detected in 97% of the samples,[55] which suggests widespread exposure. Concerns have been raised about estrogenic and other systemic effects of oxybenzone and other sunscreen ingredients.[56–58] Sunscreen ingredients have been found in human milk.[59] Because of recent data on bioaccumulation in humans and wildlife, researchers have called for an in-depth analysis of the systemic toxicology of sunscreen ingredients.[57]

Permeability of skin to topically applied products, including sunscreen products, is of concern for young infants, especially preterm infants.[60] The development of the stratum corneum, the part of the epidermis that forms the skin barrier, may not be complete until the first few years of life.[61,62] Issues have arisen regarding the possible increased risk of penetration of ultramicronized physical agents such as zinc oxide and titanium dioxide, which, when micronized, are essentially nano-

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particles. To date, no data show toxicity from absorption of sunscreen ingredients in infants and young children. Sunscreen use is advised when other effective means of photoprotection (avoidance, clothing) are not possible. Sunscreen may be used on infants younger than 6 months on small areas of skin if adequate clothing and shade are not available.[63] The known benefits of using sunscreen products for preventing sunburn and SCC, versus the concerns, should be discussed with parents, especially parents of young children.

Sunglasses protect against sun glare and harmful radiation. The latest US standard for sunglasses is voluntary and is not followed by all manufacturers.[64] Major US visual health organizations recommend that sunglasses that absorb 97% or more[65] or 99% or more[20] of the full UVR spectrum be worn. Expensive sunglasses do not necessarily provide better UVR protection; purchasing sunglasses that meet standards for a safe level of UVR should be the goal.

Standard clear window glass absorbs UVB but not UVA wavelengths.[64] Transmission of UVR through automobile glass depends on the type and the tint of the glass.

The UV index predicts the intensity of ultraviolet light for the following day,[66] which allows for the planning of activities. The index is available online for thousands of cities at www.weather.com and through local news media.

VITAMIN D

Sun exposure and vitamin D concentrations are intertwined. Humans get vitamin D from exposure to sun, dietary sources, and vitamin supplements. Vitamin D is essential for normal growth and skeletal development.[67] 25-Hydroxyvitamin D (25[OH]D) concentrations are used to assess vitamin D status; at concentrations of less than 50 nmol/L (20 ng/mL), children are at increased risk of rickets.[68] Relationships between 25(OH)D status and markers of functional outcomes in children vary according to age, race, environment, and genetic predisposition.[68–70] Children at higher risk of low 25(OH)D concentrations include breastfed infants, obese children, children with dark skin pigmentation, and children with many other conditions.[67,71,72] The benefits of vitamin D sufficiency in adults include improved bone health, prevention of fractures, better muscle health, and reduced risk of falling in older people. The nonskeletal actions and health benefits of vitamin D are becoming increasingly understood.[67,73,74] Areas of investigation include the relationship of vitamin D concentrations to risks of cancer, heart disease, multiple sclerosis, and glucose dysregulation.[72] Of particular note is that low vitamin D concentration in prenatal or childhood periods may increase the risk of type 1 diabetes mellitus.[75,76]

Hypovitaminosis D is common among US children.[77,78] Approximately 30% of US teenagers and young adults have 25(OH)D deficiency (ie, 25[OH]D $<$ 50 nmol/L).[79] For younger US children, the prevalence of 25(OH)D deficiency is somewhat less ($\sim$15% for children 6–11 years of age and $\sim$8% for children 1–5 years of age).[79]

Vitamin D concentrations increase with sun exposure. Vitamin D synthesis depends on factors including age, skin pigmentation, amount of skin exposed, time of year, and time of day. It has been stated that at least 20% of the body surface needs to be exposed to UVB for vitamin D concentrations to increase.[67] At latitudes above 35°N and below 35°S, cutaneous vitamin D production is negligible in winter months. One author has called for "sensible sun exposure" (ie, exposure of arms and legs for 5–30 minutes, depending on the time of day, season, latitude and skin pigmentation, between 10 AM and 3 PM twice weekly) to maintain vitamin D concentrations and avoid deficiency.[73,80] In contrast, the American Academy of Dermatology has stated that most people obtain enough vitamin D through incidental exposure during daily activities and that maximum production of vitamin D occurs after only brief exposure to UVR; this amount of time is 2 to 5 minutes of midday exposure for a light-skinned person living in New York, NY, or Boston, MA. Although they agree that vitamin D is important for good health, leaders in skin cancer prevention oppose intentional sun exposure to induce vitamin D production, because UVR is a known human carcinogen.[81,82] There have been no studies of children suggesting a level of sun exposure that would negate the need to comply with dietary vitamin D recommendations. Given the high prevalence of hypovitaminosis D, it seems clear that renewed attention must be paid to evaluating the adequacy of dietary and supplemental vitamin D intake and how much, if any, unprotected sun exposure is beneficial. The American Academy of Pediatrics recommends vitamin D supplementation of 400 IU (10 μg) per day for all breastfed infants and nonbreastfed infants, children, and adolescents who receive less than 400 IU of vitamin D daily in their diets.[71] Most children in the United States receive less than 400 IU of vitamin D daily.[83] Because most vitamin D is endogenously produced after sun exposure, even this degree of supplementation may be insufficient. In young white adults, the supplemental dose of vitamin D required over the winter months at or above 51° latitude for 97.5% of the sample to maintain a 25(OH)D concentration of more than 50 nmol/L was 1120 IU of vitamin D per day and was 1644 IU of vitamin D per day to maintain a 25(OH)D concentration of more than 80 nmol/L.[84] An updated report on

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vitamin D from the Institute of Medicine was released in November 2010.[85]

THE PEDIATRICIAN'S ROLE

The US Preventive Services Task Force determined that clinician counseling may have an effect on parents' use of sunscreen for their children but not for using other sun-protection measures.[86] The task force noted that only limited data exist about potential harm of counseling or of specific skin-protection behaviors. Harm includes the possibility that skin cancer counseling that focuses on sunscreen use may result in a false sense of security and more time spent in the sun because users do not sunburn.[51]

The US Preventive Services Task Force concluded that evidence is insufficient to recommend for or against routine screening for skin cancer in adults by using a total-body skin examination for the early detection of cutaneous melanoma, BCC, or SCC.[87] Early detection, however, is recommended by skin cancer authorities as a measure to increase survival rates.[88] Because most melanomas occur in adults, no official recommendations for early detection have been made for children and adolescents. Because melanoma occurs in teenagers and is a common cancer among young adults, it seems prudent to recommend that clinicians caring for these groups include a skin examination as part of a complete physical examination.

PREVENTION PROGRAMS

The Centers for Disease Control and Prevention has published guidelines to protect schoolchildren from excessive sun exposure in schools.[36] Efforts to teach children how to protect themselves from UVR are effective when implemented in primary schools and in recreational settings.[89] The SunWise program, developed by the US Environmental Protection Agency, is a brief, standardized sun-protection education program for use in schools.[90] SunWise has been shown to promote improvement in knowledge, intentions to play in the shade and to use sunscreen, and attitudes regarding healthiness of a tan[91]; SunWise also is cost-effective.[92]

Multicomponent, community-wide approaches have been recommended by health education experts[93] and can be effective. A randomized controlled trial of the SunSafe project, an intervention in New England, involved schools, child care settings, primary care offices, and beach settings. SunSafe was effective in changing sun-protection practices observed at community beaches in children 2 to 10 years of age.[94,95] In adolescence, when sun protection begins to decline, a multicomponent program slowed the deterioration of teenagers' sun-safety practices.[96]

PUBLIC HEALTH CAMPAIGNS

Australia, the country with the highest incidence of skin cancer in the world, has been in the forefront of the public health response to this disease. SunSmart, a population-based skin cancer–prevention program deployed in Australia since 1988, incorporates substantial public education efforts as well as structural and environmental change strategies in schools, workplaces, local government, and pools. Sun protection and sunburn showed substantial general improvement over time but have stalled in recent years.[97] Challenges to effective skin cancer–prevention campaigns include (1) the possible conflict between sun-protection messages to avoid or limit time outdoors during peak sun hours and health-promotion messages to promote physical activity; (2) uncertainty about how much sun exposure is needed for adequate vitamin D synthesis, which possibly results in deliberate and excessive UVR exposure; (3) the finding that skin cancer risk behaviors cluster with other risky behaviors such as smoking and risky drinking; and (4) the benefits of the tanning industry from selling carcinogenic UVR.[98] These challenges suggest that it is uncertain whether primary prevention efforts to reduce skin cancer through UVR protection will be successful.

RECOMMENDATIONS FOR PEDIATRICIANS

1. Pediatricians should incorporate advice about UVR exposure into health-supervision practices. Advice includes avoiding sunburning and suntanning, wearing clothing and hats with brims, and applying sunscreen. When feasible, outdoor activities should be planned to limit exposure to peak-intensity midday sun (10 AM to 4 PM). Sunglasses should be worn when working, driving, participating in sports, taking a walk, running errands, or doing anything in the sun.[21]
2. Sunscreen should be used when a child or adolescent might sunburn. Sunscreen with an SPF of 15 or higher should be applied every 2 hours and after swimming, sweating, or drying off with a towel. People may wish to avoid using sunscreens that contain oxybenzone, which may have weak estrogenic effects when absorbed through the skin. However, using sunscreen is recommended to decrease the known risks of sun exposure and sunburning, both of which raise the risk of developing skin cancer.
3. Advice about UVR exposure is important for all children and especially for children at high risk of developing skin cancer: children with light skin, those with nevi

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and/or freckling, and those with a family history of melanoma.

4. Skin cancer prevention is a lifelong effort. Although time is at a premium for most pediatricians, an important aim is to incorporate UVR exposure advice into at least 1 health-maintenance visit per year, beginning in infancy. Not all children sunburn, but all are at risk of adverse effects of UVR exposure on the eyes and immune system. In northern states, advice can be given in the spring and summer. Advice can also be given before anticipated sunny vacations. "Teachable moments" may be found during visits for sunburns.
5. Outdoor physical activity should be strongly encouraged; messages should be framed in the context of promoting outdoor physical activity in a sun-safe manner.
6. Sun-protection practices tend to wane in early childhood. In later childhood, it may be advisable for pediatricians to discuss sun protection with children and parents together beginning at 9 or 10 years of age, thus encouraging joint responsibility for ensuring that the child is protected.
7. Infants require special advice. Infants younger than 6 months of age should be kept out of direct sunlight and covered with appropriate protective clothing and hats. Parents may apply sunscreen when sun avoidance is impossible and, then, only on exposed areas. Preterm infants, because of a thinner stratum corneum, may have a higher susceptibility to the absorption of sunscreen ingredients.
8. Pediatricians should gain familiarity with chemical photosensitizing agents.[99] People who take medications or use topical agents known to be sensitizing should do their best to limit sun exposure and avoid all UVA from artificial sources. They should wear fully protective clothing and apply sunscreen with a high SPF that also blocks UVA wavelengths when sun exposure is inevitable.
9. Guidelines regarding vitamin D supplementation for breastfed and formula-fed infants and other children should be followed. All infants, children, and adolescents should receive at least 400 IU of vitamin D daily. If a child is at risk of hypovitaminosis D because of low intake or other factors, laboratory evaluations of the adequacy of his or her 25(OH)D concentration should be considered.
10. Deliberate UVR exposure to artificial sources and overexposure to sun with the goal of increasing vitamin D concentrations, or for other reasons, is to be avoided. UVR exposure raises skin cancer risk. Guidance should be given about vitamin D adequacy obtained through the diet and supplements.
11. When feasible, pediatricians should advocate for adoption of sun-protective policies such as shaded playgrounds, outdoor time before 10 AM, and allowing hats at schools and child care facilities.
12. Pediatricians should support and advocate for legislation to ban access to tanning parlors for children younger than 18 years.

RECOMMENDATIONS FOR GOVERNMENT

1. Federal, state, and local governments should mount campaigns to raise awareness about the dangers of exposure to artificial sources of UVR and overexposure to sun. These campaigns should include messages directed at children, adolescents, and parents.
2. Federal, state, and local governments and local school districts should support and disseminate successful programs such as the Environmental Protection Agency's SunWise program.
3. Federal, state, and local governments should work toward passing legislation to ban minors' access to tanning salons. Governments should work to ensure that such legislation is enforced.

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