
SKIN CANCER: A GROWING HEALTH PROBLEM FOR CHILDREN

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OBJECTIVES: *To explore childhood ultraviolet radiation exposure and skin carcinogenesis, review prevention practices, analyze indoor tanning trends, identify skin cancer prevention programs, and address the role of the oncology nurse in youth-focused community initiatives.*

DATA SOURCES: *Review of the literature, research, and experience.*

CONCLUSION: *Skin cancer is an important health problem for children because it is initiated in childhood and melanoma is on the rise in this population.*

IMPLICATIONS FOR NURSING PRACTICE: *Nurses can play a pivotal role in reducing the burden of skin cancer through patient education, community outreach, and political action.*

KEY WORDS: *Pediatric, education, melanoma, indoor tanning*

SKIN cancer is an important health problem for children for two reasons. First, overexposure to ultraviolet radiation (UVR) during childhood is a major risk factor for skin cancer in adulthood.¹⁻⁵ Second, melanoma, the deadly form of skin cancer, is on the rise among American children (Fig. 1).^{6,7} Overexposure to UVR in childhood is the most modifiable risk factor for skin cancer.⁸ With 69% of children reporting summer sunburns and 36% of

teenage girls reporting indoor tanning, there is sufficient evidence that UVR overexposure is rampant and current prevention strategies are inadequate.⁹ Nurses can play a pivotal role in reducing the burden of skin cancer through patient education, community outreach, and political action. This article addresses childhood skin cancer statistics, risk factors, UVR overexposure; skin cancer prevention campaigns targeting children; and role of the oncology nurse.

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SKIN CANCER IN CHILDHOOD

Two national cancer surveillance programs that provide statistics on pediatric cancer in the United States are the National Cancer Institute (NCI) Surveillance, Epidemiology, and End Results (SEER) program and the Center for Disease Control (CDC) National Program for Cancer

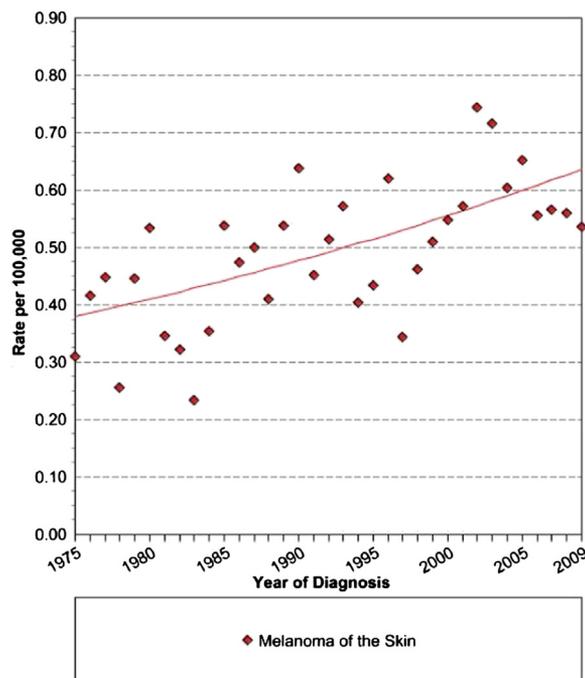


FIGURE 1. Age-adjusted SEER incidence rates by cancer site; ages < 20, all races, both sexes, 1975-2009 (SEER).⁷

Registries' Wonder database. Together they provide information on 96% of the population.¹⁰

Approximately 450 new cases of pediatric melanoma will be diagnosed in 2013.¹¹ Melanoma is the only reportable skin cancer and comprises less than 3% of the 13,500 new cases of pediatric cancer diagnosed in children under age 20 years.¹¹ However, among females age 15 to 19 years, melanoma accounts for 7% of pediatric cancer, making it the fourth most common cancer in this age group.^{12,13} The distribution of pediatric melanoma cases in the United States for 2009 is shown in Table 1. Of pediatric melanoma cases, 72% occurred in children 15 to 19 years of age; older females were almost 2 times as likely to develop melanoma as males.¹⁴ Although pediatric melanoma was found to have increased, on average, by 2% per year between 1973 and 2009, the finding that children residing in low UV-B regions had significantly higher rates of melanoma is critical.¹⁵

The risk factors for developing melanoma in childhood reflect those for the general population; including light skin, light eyes, presence of a congenital nevus or many acquired nevi (moles), as well as a history of severe sunburns, malignancy, or immunosuppression.^{16,17} Downard et al reported that a history of a bone marrow or organ transplant increased a child's risk of melanoma three-fold.¹⁸

Melanocytic nevi can be congenital (present at birth or arising within 1 year of birth), acquired (common), or atypical (dysplastic).¹⁹ Acquired nevi are usually small, symmetrical papules or macules with distinct borders and uniform color. Congenital nevi may range from small (<1.5 cm) to giant (>20 cm) with variable surface characteristics.²⁰ Atypical moles are characterized as "fuzzy" with irregular borders, variable color, and larger than 5 mm.² Five to ten percent of the population has an atypical nevus, imparting a two-fold increased risk for developing melanoma. The presence of 10 or more atypical nevi confers a 12-fold increased risk.²¹ Researchers found that 11% of pediatric melanomas developed in congenital nevi and 6% in acquired nevi.¹³

Familial Atypical Mole and Melanoma Syndrome (FAMM) is diagnosed when a patient has hundreds of atypical moles and a family history of two or more first-degree relatives with melanoma.¹⁶ This disorder is associated with the development of multiple melanomas starting early in life. Researchers found that 9% of melanomas in these "melanoma-prone families" developed within the first two decades of life.¹³

Pediatric melanoma may resemble a benign nevus, dysplastic nevus, pyogenic granuloma, Spitz nevus, or verruca.²² Half of all pediatric melanomas are amelanotic (pink, pink-white, or red) and 30% are nodular (symmetrical).^{2,17} The ABCDE acronym used in melanoma recognition is often inadequate in evaluating "new" and "changing" lesions in children. Therefore, with the absence of Asymmetry, Border irregularity, Color variability, and increasing Diameter, one may have to depend simply on the "E" for Evolving. This is important because a low index of suspicion may delay a diagnosis and worsen the prognosis.²³ Basal cell and squamous cell skin cancer, known collectively as non-melanoma skin cancer (NMSC), are increasing among young adults.² However, because NMSC is a non-reportable disease, there are no accurate estimates of the total burden of this disease among American children.

OVEREXPOSURE TO UVR IN CHILDHOOD

Children acquire 25% of their lifetime UVR exposure during childhood.²⁴ Overexposure to UVR, via natural and artificial sources, is a known risk factor for skin cancer.^{1,3,25} Sunburns and tanning are commonly seen in children; both are immediate signs of overexposure to UVR.

TABLE 1.
Pediatric Melanoma Distribution-2009 as Reported in the Wonder Database¹⁴

Age Range (yrs)	Population	No. of Cancer Cases	No. of Melanoma Cases (n%)	Age Adjusted Rate
Females (0-14)	28,939,287	4,227	44	0.2
Males (0-14)	30,281,128	4,932	50	0.2
Both (0-14)	59,220,415	9,159	94 (28%)	0.2
Females (15-19)	10,039,664	2,141	150	1.5
Males (15-19)	10,586,169	2,332	87	0.8
Both (15-19)	20,625,833	4,469	237 (72%)	1.1
Females (0-19)	38,978,951	6,368	194	0.5
Males (0-19)	40,867,297	7,264	137	0.3
Both (0-19)	79,846,248	13,628	331 (100%)	0.4

NOTE. Excludes cases in Connecticut, Hawaii, Iowa, New Mexico, and Utah. <http://wonder.cdc.gov/controller/datarequest/D75;jsessionid=DF20A5C07FF5EE95EFC77BDEC5DD0AB8.14>

Multiple studies show that half of all American children experience summer sunburns.^{9,26} Factors affecting sunburn risk include increasing age, fair skin, time spent outdoors, sporadic sunscreen use, and inadequate protective clothing.²⁷ In a study of sun protection over a 2-year period, 54% of parents of toddlers reported that their child experienced a sunburn, an increase from 22% the previous year.²⁸ “Painful” sunburns have been associated with the development of nevi in children, an acquired risk factor for melanoma.²⁹

Sun protection practices are often inadequate among children and influenced by personal and parental attitudes and behaviors.^{5,30,31} Adolescent girls were found to be twice as likely to report “liking a tan” than boys, and even young girls (grades 3 through 5) were statistically more likely to “try and get a tan most of the time or always” as compared with boys.^{26,32} An observational study that evaluated the extent of sun protection among adolescent children found that they rarely used hats, shirts, and shade.³³ Sunburn incidence was higher among children whose parents experienced sunburn themselves.³¹ In one randomized controlled study, parents that received increased sun protection advice by health care providers were significantly more likely to practice sun protection with their young children.³⁴

Sunscreen, the most preferred method of sun protection, is often inadequate or ineffective in preventing sunburn when not used appropriately. From 1999 to 2009, the percentage of white high school students who “never or rarely wore sunscreen” increased from 58% to 69%.³⁵ In adolescents, sunscreen use dropped by 60% among girls

and 70% among boys, when compared with a baseline survey 3 years earlier.²⁶ Increased regular use of sunscreen among youth (age 11 to 18 years) in one study did not significantly change sunburn trends.²⁵ Multiple authors cite that inadequate application of sunscreen affects its efficacy.^{5,25}

INDOOR TANNING TRENDS AND TEENS

The indoor tanning industry, which began in 1978, has grown to a 5 billion dollar business, with more than 1 million Americans tanning daily. In 2009, the World Health Organization added tanning beds to its highest cancer risk category, along with cigarettes and asbestos. This decision was based on an exhaustive review of 19 studies showing “sufficient and compelling” evidence that there was a 75% increased risk of melanoma for individuals who initiated indoor tanning before age 35 years.³⁶ Further evidence was provided by a case-control study that showed a 74% increased risk of melanoma among tanning bed users no matter when they began tanning.³⁷

In 2009, the CDC added a question on indoor tanning use to its Youth Risk Behavior Survey.³⁸ The survey found that 21% of female and 6% of male high school students reported having indoor tanned over the previous year.³⁹ Indoor tanning use was greatest among older, female, non-Hispanic white students. In this group, the odds of indoor tanning rose from 14% for freshman to 44% for seniors. Among these female tanners, “frequent use” defined as (≥ 10 visits/year), ranged from 44% for freshman to 68% for seniors (G. Guy,

personal communication, February 2013). Among males, indoor tanning was positively associated with taking non-prescription steroids, unhealthy weight control, binge drinking, and attempted suicide.⁴⁰ A goal of Healthy People 2020 is to reduce indoor tanning among adolescents by 10%.⁴¹

Since 2003, 11 countries have implemented tanning bans for persons under age 18 years.⁴² In the United States, 33 states have instituted youth access restrictions but only California, Vermont, Oregon, Nevada, and Texas have under age-18 restrictions. Chicago and Springfield, Illinois and Howard County, Maryland are municipalities with under age-18 bans (S. Guild, Personal Communication, July 2013). Aim at Melanoma, a non-profit organization committed to education and advocacy, mobilizes stakeholders to provide testimony in support of teenage bans nationally.⁴³

The Patient Protection and Affordable Care Act (2010) levied a 10% tax on indoor tanning visits, providing a clear message to consumers about the health risk and a disincentive to users.⁴⁴ “Truth About Indoor Tanning” is a Website that includes resources on education, legislation, and advocacy (www.bantheban4minors.org/).

PREVENTION CAMPAIGNS AND CURRICULA

A consortium of skin cancer prevention organizations (45 members) has evolved under the umbrella of the National Council on Skin Cancer Prevention (NCSCP). In 2009, NCSCP launched a national day of sun safety awareness, “Don’t Fry Day” (DFD). DFD is held on the Friday before Memorial Day and member organizations conduct activities throughout the United States to engage the public and raise awareness about sun protection and skin cancer prevention. The DFD Webpage lists available resources, including campaign materials, media tools, school activities, posters, etc. as free downloads (<http://www.skincancerprevention.org/node/282>). In 2011, the DFD campaign reached over 15 million Americans (J. Antonishak, personal communication, March 2013).

The NCSCP Website also includes a resource page for health professionals, teachers, parents, policymakers, etc. that includes links directly to Webpages that provide skin cancer-related information, including shade protection. Table 2 lists NCSCP Member Campaigns/Curricula (selected skin cancer prevention curricula and programs)

that target children.^{32,45-47} There are many wonderful state-of-the-art educational resources, products, and tools that have been designed to teach children about sun safety and skin cancer prevention. However, many of these resources never reach their intended audience because skin cancer prevention is not a societal priority.

Many states mandate health priorities for schools, including obesity, bullying, and concussion prevention, leaving little time for sun protection education. Three states, Arizona, Florida, and New Mexico, have incorporated skin cancer prevention education into their state’s cancer control plan. The SunWise Skin Cancer Prevention School Program is implemented in all public elementary schools in Arizona, the RAYS Project is implemented via mini-grants in New Mexico, and the SPF Project is implemented in counties in Florida demonstrating increased incidence of melanoma and a younger population.⁴⁸ The SunWise program has a free tool kit that includes a CD with (grades K through 8) cross-curricular and standards-based activities and a UVR-sensitive Frisbee for use in schools and community events. All school administrators should be encouraged to implement sun protection curricula, develop sun safety policies, and ensure adequate shade on campus.

ROLE OF THE ONCOLOGY NURSE

The US Preventive Services Task Force recommends that fair-skinned children and young adults between ages 10 to 24 years be counseled on minimizing exposure to UVR to reduce their risk for skin cancer.⁴⁹ Counseling alone, however, is inadequate without teaching “proper” sun protection methods. SunAWARE, an acronym used by many national organizations, incorporates a clear message regarding both primary and secondary prevention. SunAWARE is comprised of five easy, action steps, in order of prevention priority (Fig. 2).^{50,51}

Although nurses are in a strategic position to provide children-targeted skin cancer prevention education, there is little information on this in the nursing literature. One report advised that school nurses could affect the incorporation of sun safety lessons in health education curriculums.⁵² Another report indicated that pediatric nurses could play a pivotal role in educating both parents and children about sun protection.⁵³ All

TABLE 2.
Selected NCSCP Campaigns/Curriculum for Skin Cancer Prevention

Curriculum/Campaign	Organization	Targets	Weblink	Description	Evaluation
Don't Fry Day	National Council for Skin Cancer Prevention	Children/adults	http://www.skincancerprevention.org/node/282?q=programs/dont-fry-day/resources	A National Skin Cancer Prevention Awareness Day. Website includes free resources, activities, events, and media tools.	No research-based testing
Spot Skin Cancer	American Academy of Dermatology	Ages 4-11	www.spotskincancer.org	Gigi the Giraffe, new mascot, featured in free children's toolkit (coloring pages, activity sheets, and much more). Event planning guide and additional educational resources available.	No research-based testing
The Sun Show	Sun Safety for Kids	Ages 6-8	http://www.sunsafetyforkids.org/index.html	Award winning (Aegis) educational video, sun safety resource information, and school policy on sun protection available.	No research-based testing
SunAWARE	Children's Melanoma Prevention Foundation	Grades K-2 3-5 6-8 9-12	www.melanomaprevention.org	Curriculum designed to teach children factors that affect UV intensity and skin sensitivity, skin cancer recognition, and proper sun protection. Free SunAWARE Epub books and fliers.	Ref 45
SunWise	US Environmental Protection Agency	Grades K-2, 3-5 6-8	www.epa.gov/sunwise/	Teaches the science behind UV radiation, risk of overexposure, and protection steps. Free Tool Kit for K-8 and community programming.	Refs 46, 47
SunSmart America	Richard Kann Melanoma Foundation	Grades K-5 6-8 9-12	www.melanomafoundation.com/	Cross-curricular, interactive, fun program to teach rationale for sun protection and skin cancer prevention.	Ref 32 Baseline testing

SunSmart U: Rays Awareness	Skin Cancer Foundation	Grades 6-12	www.skincancer.org/prevention/education-program/rays-awareness	Interactive educational program with free downloadable lesson plan, gives educators resources to teach youth how to make sun-safe choices. Provides free poster featuring skin cancer prevention tips also available.	Tracks number of lessons downloaded
Time Out, Protect Your Skin initiative (TOPS)	Women's Dermatology Society	Five Schools-2013	www.playsafethesun.org	"Sun-proofs" schools by providing education materials, presentations, sunscreen, UV bracelets, and funding for a shade project for selected schools.	No research-based testing

Abbreviation: UV, ultraviolet.

SunAWARE

Avoid unprotected exposure to sunlight, seek shade, and never indoor tan.

Wear sun protective clothing, including a long-sleeved shirt, pants, a wide-brimmed hat, and sunglasses year-round.

Apply recommended amounts of broad-spectrum sunscreen with a Sun Protection Factor (SPF) ≥ 15 to all exposed skin and reapply every two hours, or as needed.

Routinely examine your whole body for changes in your skin and report concerns to a parent or healthcare provider.

Educate your family and community about the need to be SunAWARE.

Be Safe. Be SunAWARE!

FIGURE 2. SunAWARE acronym.

nursing organizations whose mission is health promotion or cancer prevention should have sun protection and skin cancer prevention education resources available to their members. The Dermatology Nurses' Association (DNA) endorsed the SunAWARE acronym as their official skin cancer prevention message in 2007. This acronym was then incorporated into DNA's educational materials for DFD. This handout is available as a free download at http://www.dnanurse.org/sites/default/files/downloads/2011/DontFryHandout_general_2011%20updated%203.23.11.pdf.

In conclusion, oncology nurses play an important role in educating children and their parents about proper sun protection. Nurses should also support legislative action toward restricting indoor tanning for children. May, Melanoma Awareness Month, is an optimal time to volunteer in the workplace, provide community public education programs, or participate in skin cancer screenings. Nurses can apply for shade grants from the American Academy of Dermatology or the Shade Foundation for use in their communities or local schools, as well as apply for program grants from private, public, and government agencies. Maximum impact will be achieved when nursing organizations work together to protect children from overexposure to natural and artificial sources of UVR, the ultimate human carcinogen.

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