

The Importance of **Sun Safety** for School-Aged Children

During mild weather, children and adolescents spend a great deal of time outdoors.¹ Backyard barbecues, trips to the lake or ocean, camping in the mountains, or playing team sports. . . . all of these take place outdoors. In many areas, school lets out in the early summer, allowing children to spend several months out in the hot sun. Teachers need to be knowledgeable about the dangers of sun exposure and to teach children and parents sun-safety practices and employ them themselves. Although many cancers have unexplained origins, melanoma and other types of skin cancer are undoubtedly caused by overexposure to the sun.²

In California (U.S.A.), the film industry, media hype, fashion magazines, and the surfing culture all promote tanning. To the teen population, a dark tan is an absolute must in order to appear attractive. Moreover, tanning beds, tanning booths, and home sun lamps are specifically designed to make the tanning process easier, quicker, and available year round.³

The effect of these summertime rituals is that children and adults accidentally and unknowingly suffer overexposure to ultraviolet (UV) radiation. Both sunburns and cumulative overexposure to the sun without burning can lead to a host of health- and life-threatening conditions.⁴ In fact, children 5 to 18 years of age accumulate 80 percent of their total lifetime sun exposure during their primary and secondary school years. Because of the potential for serious lifelong consequences to their health, children have become the primary focus of many national and international sun-safety programs.⁵ The old saying, “an ounce of prevention is worth a pound of cure,” is a life-saving reminder.

Case Study

Ronnie Osborn, age 13, was diagnosed with melanoma five years ago. His mother’s



Both sunburns and cumulative overexposure to the sun without burning can lead to a host of health- and life-threatening conditions.

BY ELIZABETH A. HOLZHAUSER AND R. PATTI HERRING



Because of the potential for serious life-long consequences to their health, children have become the primary focus of many national and international sun-safety programs.

cautious nature and love for reading saved his life. She started reading about melanoma after two family members (a brother and a cousin) were diagnosed and started treatment. Their primary sites were moles—her brother’s on his forearm and her cousin’s on her face. This frightened her, since Ronnie had been born with a small mole in the same location as her brother’s cancerous mole. She took him to her family doctor, who immediately made an appointment for the mole to be removed. This quick response saved Ronnie’s life, as the mole was cancerous. Now cancer-free, Ronnie is careful to protect his skin from the sun at all times. His mother and the school nurse work together to ensure that Ronnie has sunscreen and protective clothing available at all times, and his teachers allow him to apply the sunscreen at proper intervals.

The Problem—Ultraviolet (UV) Radiation

Sunlight is largely composed of invisible ultraviolet radiation (UVA) in addition to a much smaller amount of UVB. For good health, humans require a certain amount of sunlight, which helps the body create vitamin D and protects against rickets and psoriasis.⁶ However, sunlight is a major factor in both melanoma and non-melanoma skin cancers.⁷ In fact, exposure to UV radiation causes 90 percent of all skin cancer cases in light-skinned individuals.⁸ Excessive ultraviolet radiation can also cause other problems, such as:

- Painful, blistering sunburns;
- Premature wrinkling of the skin (especially the face) by damaging the cellular structure;
- Suppression of the immune system by causing a lagging effect in the cells that trigger life-saving responses;

• Premature cataracts by damaging the inner lens of the eye;

- The development of moles (nevi) and freckles (both considered precursors for skin cancer); and
- Pigmented (age) spots on the face and hands, similar to freckles, which, over time, become enlarged and more numerous.⁹

Sun-tanning equipment such as tanning beds, booths, and sun lamps emit artificial UV radiation. In the past, these rays were thought to be safer than natural light, but experts report that the damaging effects are virtually identical.¹⁰

Moles (Nevi)¹¹

On girls, moles are sometimes referred to as “beauty marks” or “angel kisses,” especially if they are dark and located on the face. Interestingly, moles vary in color and shape, and they even have individual growth patterns. Congenital moles, which can appear anywhere on the body, are normally visible at or shortly after birth, but moles can also appear during childhood as a result of overexposure to the sun.

The average fair-skinned individual may develop 40–60 moles, usually on the face, ears, neck, back, chest, stomach, or legs. All moles darken considerably during adolescence.

Although some types of moles are harmless, just having moles (either acquired or congenital) is an important risk factor for skin cancer. Continually exposing unprotected moles to ultraviolet light is especially risky for fair-skinned people.¹² For photos of dangerous moles, refer to http://www.skincancer.org/self_exam/look_for.php.

Sun Vulnerability

Table 1 will help you to identify your own risk of sunburn and associated health problems that result from overexposure to the sun, as well as your students' level of risk. The natural color of the skin, eyes, and hair are important risk predictors.

Individuals with dark brown or black skin are less likely than whites to develop skin cancer and other conditions resulting from overexposure to the sun, but they are not

immune. Thus, all teachers should learn how to protect themselves and what to tell their students about the risks caused by UV radiation.¹³

Risk factors for skin cancer include:

- Age (after 40);
- Naturally fair skin (pale white or rose);
- Naturally light-colored hair (blonde, red, light brown);
- Moles (congenital or acquired) and other types of

Table 1
Sunburn Risks¹⁴

Personal Characteristics	Skin, Hair, Eye Color	Sunburn Risk	Health Consequences of Overexposure
Profile No. 1	<ul style="list-style-type: none"> • Very pale skin • Ivory or rose undertones • Blonde or red hair • Blue or green eyes 	<ul style="list-style-type: none"> • Extremely susceptible to burning • Does not tan 	<ul style="list-style-type: none"> • High risk for sun damage to the skin—freckles and acquired moles may result from overexposure • High risk for all forms of skin cancer • Damage to immune system and eyes from chronic overexposure
Profile No. 2	<ul style="list-style-type: none"> • Pale skin color with very light rose or olive undertones • Blonde or light brown hair • Blue, green, or light brown eyes 	<ul style="list-style-type: none"> • Very susceptible to burning • After repeated burning incidents, skin may tan to very light brown 	<ul style="list-style-type: none"> • High risk for sun damage to the skin—freckles and acquired moles may result from overexposure • High risk for all types of skin cancer • Damage to immune system and eyes from chronic overexposure
Profile No. 3	<ul style="list-style-type: none"> • Light skin with medium olive undertones • Light to dark brown hair • Blue, green, or brown eyes 	<ul style="list-style-type: none"> • Intermediate burn risk; skin can tan to light brown 	<ul style="list-style-type: none"> • High risk for sun damage to acquired moles may result from overexposure • Moderate risk for skin cancer • Damage to immune system and eyes from chronic overexposure
Profile No. 4	<ul style="list-style-type: none"> • Skin has medium olive undertone • Dark brown hair • Brown or black eyes 	<ul style="list-style-type: none"> • Skin will tan to medium brown with minimal risk of burning 	<ul style="list-style-type: none"> • Sun damage to the skin may occur if overexposed • Moderate risk for skin cancer • Damage to immune system and eyes from chronic overexposure
Profile No. 5	<ul style="list-style-type: none"> • Dark brown to light black skin • Brown or black hair • Brown or black eyes 	<ul style="list-style-type: none"> • Tans very rapidly • Capacity to burn is minimal 	<ul style="list-style-type: none"> • Sun damage to the skin may occur with overexposure • Damage to immune system and eyes from chronic overexposure
Profile No. 6	<ul style="list-style-type: none"> • Black skin • Black hair • Black eyes 	<ul style="list-style-type: none"> • Unlikely to burn 	<ul style="list-style-type: none"> • Sun damage to the skin may occur with overexposure • Damage to immune system and eyes from chronic overexposure

dark pigmented areas, which may have jagged borders or contain more than one color;

- Close family members with a history of melanoma¹⁵;
- “Severe sunburn in childhood [which] carries with it an excessive risk of melanoma in adult life.”¹⁶

“There is a simple ABCD rule to help identify a possible melanoma. **A** is for asymmetry—melanoma looks like a mole in which one half does not match the other. **B** is for border irregularity—the edges are ragged, notched, or blurred. **C** is for color—the growth is darkly but irregularly pigmented. **D** is for diameter—any growth that is more than six millimeters (about one-quarter inch) in diameter or is increasing in diameter should be examined by a physician.”¹⁷

Sun Protection—The Layered Approach

Frequent and repeated sunburns put children at risk for skin cancers later in life.¹⁸ The face (nose and lips), chest, neck, arms, and tops of the ears are the most vulnerable spots. Therefore, children should wear appropriate clothing and personal accessories and use sunscreen products to protect them from exposure to the sun.¹⁹ Parents and teachers should teach sun safety and ensure that children are well protected at all times. Adults, too, need to protect themselves against sunburn.

Long pants or skirts and tightly woven, long-sleeve shirts or blouses offer the best protection. (In hot or humid weather, knee-length denim shorts will provide some protection.) Denim has a sun-protection factor (SPF) of

Table 2

A Checklist of Sun-Safe Gear and Accessories

Protecting the Upper Body

Wear shirts with the following:

- Long sleeves
- Long length (completely covering torso and stomach)
- Loose fit
- Tight weave (cotton)
- Dark color

Protecting the Upper Body - Humid/Hot Weather

Wear shirts with the following:

- Shorter sleeves (sleeves that cover the upper arm)
- Length that completely covers torso
- Light color fabric
- Loose weave

Hats

- Wide brimmed—brim should shade face, ears, and back of neck
- Baseball hats (second alternative)—brim should be long enough to shade the face

Sunglasses

- UV coating to block 100 percent of the UV rays
- Color on the lens (optional)
- Frames that bend or contour to the shape of the face

Sunscreen

- At least SPF 15 or higher
- Apply generously to all exposed areas, including the middle of the back
- Use in conjunction with sun-safe apparel options and accessories

Protecting the Lower Body:

- Pants: Tight weave
- Cover the entire leg
- Loose fit

Protecting the Lower Body - Humid/Hot Weather

- Shorts: Tight weave
- Longer length (covering the knee)
- Loose fit

1,700.²⁰ In addition to wearing as much clothing as the temperature permits, students and teachers should apply protective products (sunscreen cream or lotion of at least SPF 15) to any exposed skin, including the lips. They should also wear a wide-brimmed hat, sunglasses, and other sun-safe gear designed for hot weather.²¹

Teachers and students should wear sunglasses at all times when outside. In Australia, where the protective ozone layer is very thin, most people wear sunglasses, even very young children. In the United States, a lot of people

wear sunglasses to look stylish but fewer than eight percent of children wear them specifically for sun protection.²² Everyone should wear sunglasses with UV-coated lens when out of doors because ultraviolet radiation can damage the delicate cellular structure of the eye. "Like your skin, your eyes never recover from UV exposure."²³

The chemical coating, not the darkness of the tint, provides the UV protection. Most commercial sunglasses, including inexpensive ones, have a UV coating. Usually, the coating provides 90–100 percent protection.²⁴ Even

Sun Protection Resources

The following agencies provide sun protection information resources for primary school teachers*

Intersun, The Global UV Project

Protection of the Human Environment
World Health Organization
1211 Geneva 27
Switzerland
<http://www.who.int/peh/uv>

Australia:

SunSmart Campaign
The Cancer Council Victoria
1 Rathdowne Street
Carlton, Vic 3053
<http://www.sunsmart.com.au/>

Cancer Foundation of Western Australia Inc.

46 Ventnor Avenue
West Perth, WA 6005
<http://www.cancerwa.asn.au>

Canada:

Children's UV Index Sun Awareness Program
Meteorological Service of Canada
4905 Dufferin Street
Downsview, ON M3HST4
<http://www.msc-smc.ec.gc.ca/uvindex/>

France:

Vivre avec le soleil
Securite Solaire
15 rue Manin
F-75019 Paris
<http://www.infosoleil.com/vivreaveclesoleil.php>

Germany:

Deutsche Krebshilfe e.V.
Thomas-Mann-Str.40
53111 Bonn
Postfach 1467
53004 Bonn
<http://www.krebshilfe.de>

Israel:

Israeli Cancer Association
Revivim Street 7
P.O. Box 437
53104 Givatayim
<http://cancer.org.il/>

Northern Ireland:

Care in the Sun
Green Park Healthcare Trust
Health Promotion Department
Musgrave Park Hospital
Stockman's Lane
Belfast BT97JB
<http://www.careinthesun.org/>

United Kingdom:

SunSafe
Department of Health
Richmond House
79 Whitehall
London SW1A 2NS
<http://www.doh.gov.uk/sunSAFE>

United States:

SunGuard Man Online
Coalition for Skin Cancer Prevention in Maryland
1211 Cathedral Street
Baltimore, MD 21201
<http://www.sunguardman.org>

The SunSafe Project

Norris Cotton Cancer Center, HB 7925
One Medical Center Drive
Lebanon, NH 03756
<http://www.dartmouth.edu/dms/sunSAFE/>

SunWise School Program

United States Environmental Protection Agency
1200 Pennsylvania Avenue NW
Mail Code 6205J
Washington, DC 20460
<http://www.epa.gov/sunwise/>

Sunwise Stampede

American Zoo and Aquarium Association
8403 Colesville Road
Suite 710
Silver Spring, MD 20910-3314
<http://www.foundation.sdsu.edu/sunwisestampede/>

*WHO, *Sun Protection and Schools: How to Make a Difference*:
<http://www.who.int/UV/publications/sunschools>.

people who wear contact lenses with UV protection need to wear sunglasses when exposed to the sun.²⁵

It is also critically important for teachers and students to wear **hats** for sun protection. These hats should be made of tightly woven straw or other dense fabric and have a three-inch-wide brim to protect the entire face, ears, and the back of the neck.

The standard baseball cap (a common American fashion accessory) provides minimal sun protection, as it leaves the face, ears, and neck (front and back) largely unprotected. Even when one wears a hat, sunscreen should be applied to the face, ears, neck, and lips.²⁶

Sunscreen Products²⁷

Though they are widely used, there is a good deal of misunderstanding about the effectiveness and limitations of sun-protection products. First, every sunscreen product has an SPF rating. Consumers assume that if the sunscreen product has a high SPF, then they are well protected and can spend longer periods outside. This may not be the case, so keep in mind these factors to ensure that you and the children under your care are well protected:

- The SPF strength is important. Investigate the appropriate strength needed for the planned outdoor activity.
- Check to be sure that the sunscreen protects against

Sunlight is a major factor in both melanoma and non-melanoma skin cancers.

both UVA and UVB rays.

- Sunscreen must be applied to all exposed skin surfaces. Not applying enough sunscreen critically reduces the products' overall SPF protection.

- Weather conditions can adversely affect the effectiveness of sunscreen products.

- Tropical conditions (alternating sunshine and rainfall) will interfere with the effectiveness of a product, as will sweat, water, or towelings off.

- Use by the expiration date or one year after purchase.

In order for sunscreen to effectively block and deflect the sun's rays, it must be allowed to dry for at least 30 minutes. Sunscreen should be reapplied every two hours if one is sweating profusely, engaging in water activities, and/or exposed to the sun between 10:00 a.m. and 3:00 p.m., even in winter.

In summary, remember that UV exposure will vary, depending on the following factors:²⁸

- **Outdoor temperature:** Whether the temperature is sweltering or subfreezing, overexposure can occur. No one is safe outdoors for extended periods without proper sun protection.

- **Weather:** Snow, cloud cover, and haze can all increase UV damage. Cumulative sun exposure increases the risk.

- **Type of outdoor activity.** Outdoor activities require varying types of sun-safe gear. Be especially careful to protect body parts exposed by uniforms, gauzy material, and swim suits.

- **Duration of activity:** The sun-safe gear required





for a one-hour activity may be significantly different than one that lasts all day.

In some areas of the world, sunscreen products may be prohibitively expensive. In such cases, teachers and parents will have to work together to ensure that children wear appropriate clothing to prevent excessive exposure to the sun.

Sun Safety Recommendations for School-Aged Children

Children (0-18 years) are considered a highly vulnerable population for ultraviolet radiation exposure. Early prevention programs will not only raise awareness about the dangers of overexposure during childhood, but may

also reduce the incidence of skin cancers in young adults.²⁹ The World Health Organization (WHO), the United States Environmental Protection Agency (USEPA), and the Centers for Disease Control and Prevention (CDC) all advocate that sun-safety programs be taught to children beginning in primary school.³⁰

Sun-safety education can easily be combined with other types of health or self-protection programs. Some of the benefits are as follows:

- Teachers can model and inspire behavior change in their students.
- Sun-safe materials for teachers and students are free or available at a very reasonable cost (see the resources on page 41).
- Children spend a major portion of their time at school, so a majority of accidental overexposures occur during the school day³¹ and are therefore preventable.

Sun-Safety School Programs

The primary goal for a school-sponsored sun-safety program is simple: Minimize students' exposure to UV during school hours and teach them how to be sun safe for life. This will benefit everyone, regardless of skin color or age. Minimizing ultraviolet radiation exposure should be addressed at three levels: educational, environmental, and policy.

Educational: The educational component should stress a skills- or activity-based curriculum. For example, WHO's *Sun Protection, A Primary Teaching Resource* has ready-made lesson plans that can be integrated into the science, math, environmental, and personal health curricula. The lessons span several grade levels and include age-appropriate learning objectives and downloadable worksheets. The lessons are designed to increase children's knowledge and skills, and discourage unsafe sun practices such as tanning.³²

A variety of excellent sun-safe strategies can be adapted to suit cultural, seasonal, and geographical needs. They include storytelling, demonstration projects, role-playing, and behavior modeling.

Students at the secondary and tertiary levels also need information about sun safety through health classes, handouts, and seminars.

Environmental: As previously discussed, the physical en-



vironment heavily influences personal sun exposure. Creating shaded areas is an effective method of reducing UV exposure. Whether shade is natural, temporary, or artificially created, the benefits are the same.

Most educational facilities lack adequate natural and/or structural elements that minimize sun exposure. Schools might consider the following:

- Planting fast-growing trees to provide natural shade
- Erecting shade structures such as ventilated tarps to cover lunch or play areas
- Covering bleachers and walkways
- Installing awnings and outdoor umbrellas

Policy: Administrators also need to establish formal standards and rules to protect children from ultraviolet radiation while on school property. First, examine the current policies to see if they discourage protection against UV exposure. In many locations, schools prohibit children from wearing sunglasses or hats on school grounds because these may indicate gang membership. Furthermore, sunscreen is considered a “medicine,” the application of which requires parental permission. Even with parental consent, teachers are discouraged from helping children to apply it.³³

If schools have concerns in these areas, they can remind parents to apply sunscreen to their younger children prior to sending them to school, and give older children the opportunity to apply their own sunscreen during the school day with parental consent. A sun-safety clothes closet containing oversized long-sleeve shirts and large-brimmed hats that children can borrow and wear while out of doors is another low-cost idea. If students wear a required school uniform, it can be designed to minimize UV exposure. Schools can also sell custom-made caps for children to wear. This provides some measure of control over what type, size, and color of hats are worn at school.

Conclusion

Overexposure to ultraviolet rays can be deadly. These preventive measures could save your life and the lives of the children under your care. Proper clothing and sunscreen lotions are widely available that effectively protect against the sun’s harmful rays and deadly skin cancer. Schools need to be more aggressive about teaching children, their families, and school personnel about the importance of shielding their skin from the sun. Schools can also make sunscreen available, with parental consent, when children forget to bring it from home. ✍



Elizabeth A. Holzhauser



R. Patti Herring

Elizabeth A. Holzhauser, M.P.H., C.H.E.S., is a Dr.P.H. student in Health Promotion at the Loma

Linda University (LLU) School of Public Health in Loma Linda, California. **R. Patti Herring, Ph.D., R.N.,** is an Associate Professor at the LLU School of Public Health, in the Department of Health Promotion and Education. She is also Associate Director of the Adventist Health Study-2 in charge of black/African-American recruitment.

REFERENCES

1. Morbidity and Mortality Weekly Report (MMWR), *Guidelines for School Programs to Prevent Skin Cancer* 51: RR-4 (April 26, 2002): <http://www.cdc.gov-search:sunburn>, p. 50.
2. World Health Organization (WHO), “Health Effects of UV Radiation,” at http://www.who.int/uv/health/uv_health2/en/ring.html. Accessed July 19, 2005.
3. MMWR, *Guidelines for School Programs to Prevent Skin Cancer*, p. 4; WHO, *Sun Protection and Schools: How to Make a Difference*: <http://www.who.int/uv/publications/sunschools>.
4. WHO, *Sun Protection & Schools: How to Make a Difference*; WHO, *Global Solar-UV Index: A Practical Guide* (2002): <http://www.epa.gov/sunwise>, p. 15.
5. MMWR, *Guidelines for School Programs to Prevent Skin Cancer*, p. 1.
6. WHO, *Global Solar-UV Index*, p. 3; WHO, *Sun Protection and Schools: How to Make a Difference*, p. 1. Persons who are rarely exposed to the sun should eat foods rich in vitamin D and take a multivitamin pill daily. Sunblock lotions do not prevent the body from absorbing Vitamin D.
7. WHO, “Health Effects of UV Radiation,” p. 1.
8. WHO, *Global Solar-UV Index*, p. 7.
9. C. O. Byer and L. W. Shainberg, *Living Well: Health in Your Hands* (New York: HarperCollins Publishers, Inc., 1991), p. 280.
10. MMWR, *Guidelines for School Programs to Prevent Skin Cancer*, p. 4.
11. American Academy of Dermatology (AAD), Moles: <http://www.aad.org/public/Publications/pamphlets/moles.htm>; *Who Is Most at Risk for Melanoma?* http://www.skincare/physicians.com/skincancernet/who_is_most.html.
12. *Who Is Most at Risk for Melanoma?*, p. 5.
13. *Ibid.*, p. 3.
14. WHO, *Global Solar-UV Index*.
15. MMWR, *Guidelines for School Programs to Prevent Skin Cancer*, p. 1; Byers and Shainberg, p. 521.
16. *Ibid.*, pp. 521, 522.
17. Byer and Shainberg.
18. MMWR, *Guidelines for School Programs to Prevent Skin Cancer*; Byer and Shainberg.
19. WHO, *Sun Protection and Schools; Who Is Most at Risk for Melanoma?*
20. National Ag Safety Database (NASD), *Farm Bureau Safety Program—Sun Safety*. Farm Bureau Safety Program: [http://www.cdc.gov/nasd/docs\[search:sun safety\]](http://www.cdc.gov/nasd/docs[search:sun%20safety]).
21. MMWR, *Guidelines for School Programs to Prevent Skin Cancer*, p. 4.
22. *Ibid.*; WHO, *Global Solar-UV Index*.
23. “Eyes Need Sunblock, Too,” From American Academy of Ophthalmology, published on Science Blog: <http://www.scienceblog.com/cms/node/8316>. Accessed July 19, 2005.
24. MMWR, *Guidelines for School Programs to Prevent Skin Cancer*, p. 4.
25. Science Blog.
26. MMWR, *Guidelines for School Programs to Prevent Skin Cancer*, p. 4.
27. *Ibid.*
28. WHO, *Global Solar-UV Index*.
29. EPA, *The Sun, UV, and You: A Guide to SunWise Behavior*.
30. *Ibid.*; MMWR, *Guidelines for School Programs to Prevent Skin Cancer*, p. 1.
31. WHO, *Sun Protection: A Primary Teaching Resource*, p. 12.
32. *Ibid.*
33. MMWR, *Guidelines for School Programs to Prevent Skin Cancer*.
34. WHO, *Sun Protection and Schools: How to Make a Difference*.