A Multidisciplinary Approach Challenging Current Thinking on UV and Glare

CONSENSUS FROM THE UV AND GLARE ROUNDTABLE

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Ultraviolet radiation (UVR) is a significant health hazard that can cause skin cancer, a variety of serious eye diseases, and blindness. While these hazards are well-documented, and simple and inexpensive preventive measures are readily available, it is clear that throughout the world, people generally ignore the hazards and fail to protect themselves sufficiently.

Seeking insight into both the health impacts of UVR and the causes of such widespread inattention to the dangers, Transitions Optical, Inc., convened the UV and Glare Roundtable on August 23, 2005 at Keswick Hall, Charlottesville, Virginia. Roundtable participants included a physicist, two ophthalmologists, two optometrists, a dermatologist, a family physician, and a pediatrician.

Each participant gave a half-hour presentation about UVR as it pertains to the participant’s own discipline and professional experience. The result was a group synthesis of key insights and ideas that could provide a basis for a recommendation on implementing UV-protection programs in the United States.

Key Points

The participants found all of the presentations to be valuable and educational, giving them an excellent opportunity to learn about the dangers of UVR radiation and the means of protection in a comprehensive and enjoyable way.

The participants were in consensus with the following major points:

1. An Important Issue

The participants were unanimous in their belief that the dangers of UV radiation are significant, and that the need for many different forms of protection is important in safeguarding the health of patients and the public. This issue is worthy of the continuing efforts of participants, of health care professionals, and of society.

2. Public Policy

The public simply does not understand the magnitude of the threat that UV exposure presents. Education efforts to date have not been sufficient. Thus, significant public policy initiatives are needed to increase the awareness of children, families, and educators about the dangers of UV radiation and the steps needed to protect themselves. Although the awareness programs initiated in Australia may be a good model for the US, they need to be modified to include greater awareness of the need for vision protection.

3. Interdisciplinary Education

The participants agreed that health care practitioners in every field could benefit enormously from this interdisciplinary discussion. A significant discovery that emerged from the discussion was that the medical professionals are aware of the potential hazards and the health impacts of UVR pertaining to their own specialty, but not outside of their own specialty. Those focusing on vision health did not have a thorough understanding of the hazards to the skin, and vice versa. Thus, the participants also recognize the need for complementary patient referral between and among vision and skin specialists – dermatologists, ophthalmologists, and optometrists.

4. Recommended Protection

- Skin protection includes UV protective clothing, hat with a minimum 3” brim, and consistent use of sunscreen. As a precaution, any new or changing marks should be checked promptly by a qualified physician.
- Eye protection includes UV-protective lenses and filters for all outdoor use. Larger lenses that sit close to the eyes are preferred because they provide better protection. Photochromic lenses can be very effective and convenient as well. Ophthalmic or ophthalmic vision should be scheduled regularly for proactive care.
- People should avoid excessive sun exposure between the hours of 10 AM and 2 PM, when UV radiation peaks, and they should be attentive to light reflected from snow, water, sand, and pavement.

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THE UV INDEX

The UV index (UVI) has been set as an international standard to represent the intensity of solar UV radiation at the earth’s surface on any given day. The index ranges from zero upward, with higher values indicating a greater potential for UV damage to the skin and eyes, and a shorter exposure time for damage to occur. Sun exposure behaviors comprise the most significant individual risk factors for UV damage. Therefore, the UVI is a significant educational tool that can be used to encourage people to reduce their exposure to UVR, and to implement effective protective measures on any given day. The UVI can be incorporated into educational programs on UV protection, and can be used as a guide to change attitudes and behaviors regarding UVR exposure. UVR dangers should remind people that exposure in everyday life needs to be monitored, and appropriate UV protection of the eyes and skin needs to be implemented. If the weather report is used to know when one should wear a suncoat or warmer clothing, then the UVI should be considered to determine when UV protection needs to be taken. This will require cooperation of the media in interpreting the UVI, and an increase in public awareness and understanding of the UVI, and a willingness to use the information contained in a World Health Organization, Global Solar UV Index—A Practical Guide. A joint recommendation of World Health Organization, World Meteorological Organization, United Nations Environment Programme-International Commission on Non-Ionizing Radiation Protection. As an aid in using the UVI and in understanding its implications, the US Environmental Protection Agency (EPA) has created a website that gives the UVI by ZIP code, and describes what protective steps are appropriate for that given UVI.

UV leads to skin cancer, but only 6% were aware of the damage it caused the eyes.11

Attitude about participating in effective sun-protection behavior rests on an awareness of the dangers of UVR and the procedures needed to avoid them. Mourning evidence shows an appallingly low level of awareness concerning the hazards of UVR—particularly with regard to eye health and well-being.

For example, in 1998, The American Cancer Society (ACS) conducted the first nationwide study of the sun exposure and sun protection habits of people 11-18 years of age.17 The survey found a dangerous degree of sun exposure, despite the use of sunscreens. About 72% of the youths surveyed stated that they got sunburned during the summer despite the use of sunscreen.

A study of sunscreen use by 15,000 US high school students in the US18 showed that only 13.3% of students used sunscreen on a regular basis (always or most of the time) (Table 3). In yet another study of 10,000 children and adolescents in the US, it was revealed that only 40% of girls and 26% of boys used sunscreen. Appallingly, a third of the girls and a quarter of the boys thought that it was a good idea to burn when getting a good tan.

Although these studies did not focus on eye protection, it can probably be assumed that, given these young people’s attitudes about the dangers of the sun and UVR in general, they do not use significant eye protection. The results of these studies take on added weight considering that 90% of lifetime exposure to the sun occurs by age 18.18
Absorption by the Skin

UVA and UVB penetrate the skin to different depths (Figure 7). UVB does not go much below the epidermis. UVA, however, can penetrate the dermis and subcutaneous layer and reach the muscles and bones. UVA and UVB have the potential to damage these structures, and the effects are cumulative over a lifetime.

Absorption by the Eye

Visible light penetrates the cornea and lens to impinge on the retina (Figure 5). Some UVR is absorbed by the cornea. The remainder of the UVB and UVA is absorbed by the adult human lens. Little, if any, UVA reaches the retina. However, the very young human lens transmits a small window of UV A light to the retina.

UV Damage to the Eye

It must be borne in mind that both UVA and UVB can cause damage to the eye. UVA and UVB are known to be absorbed by the skin and can cause damage to the skin. UVA and UVB have the potential to damage the skin and cause skin cancer.

HAZARDS OF SUNLIGHT EXPOSURE

Glabre

Glabre is a significant factor in visual acuity and its effects can range from mild discomfort to virtually blinding an individual experiencing it. Fundamentally, glare is the loss in visual performance or visibility, or the annoyance or discomfort produced by luminance in the visual field that is greater than the luminance to which the eyes are adapted. Simply put, this means that one will experience the effects of glare to the unaided eye when going from indoors, for instance, where the illuminance is about 400 lumens, to the outdoors where the illuminance may range from 1,000 to 3,500 lumens (the comfort limit). Glare can also be produced by highly reflective surfaces, or by looking directly into the sun, or into the headlights of an oncoming car. There are several types of glare—disturbing, discomforting, disabling, and blinding. All can be caused by direct or reflected light. Disrupting glare causes minor annoyance from reflections on the lens surface or from within the lens. Discomforting glare starts at around 3,000 lumens and can reach levels that are disabling. Low-level discomforting glare induces squinting, leads to fatigue, and can occur even on overcast days. As luminance increases, discomforting glare results in pupillary constriction and head turning. With age, the tolerance to glare decreases and the onset of discomfort tends to occur at lower levels of luminance. When light intensity approaches 10,000 lumens, it effectively blocks vision and disabling glare ensues. Glare diminishes the apparent contrast of objects. When reflected light causes blinding glare, such as from a car windshield or hood, the light can be blinding to the point of dangerously obstructing sight behind the glare. This can have dire consequences, such as when blinding glare from a car windshield obscures a pedestrian vision of oncoming traffic, or it temporarily blinds a construction worker performing a hazardous task. In the final analysis, glare results in eyestrain, headache, and diminished vision, where there is a reduction in depth perception and contrast sensitivity.

Absorption by the Skin

UVA and UVB penetrate the skin to different depths (Figure 7). UVR does not go much below the epidermis. UVA, however, penetrates the dermis and subcutaneous layers. Because it is a much larger portion of the skin, the dermis is subject to considerable UV damage and subsequent photo-aging. UVR radiation varies over the day, and is strongest between 10 AM and 2 PM, but the variation in UVA is much less pronounced. Another difference between UVA and UVB is that a sunburn from UVB is noticeable on the first day, whereas a UVA sunburn may take up to 72 hours to become evident.

CONJUNCTIVA

UVB damage leads to the formation of pterygium and pinguecula of the conjunctiva. Pterygia occur frequently in low latitudes, such as in the southern US, and the tropics, and is common among dark-skinned people—which points to the universal need for UV protection regardless of race or ethnicity.

Cornea

The cornea is the clear, transparent tissue that covers the front of the eye. It is the most transparent of all the tissues in the body and allows light to pass through without scattering or distortion. The cornea is composed of five layers: the epithelium, Bowman’s layer, stroma, Descemet’s membrane, and endothelium. The cornea is responsible for focusing light onto the retina, and it is the first tissue to be affected by UV exposure.

The Lens and Retina

Chronic exposure to UVR increases the risk of developing age-related cataracts. The most insidious, chronic consequence, however, is AMD. Again, it should be noted that 75% of UVR passes through the crystalline lens in children under the age of 10—a time in life when sun exposure is apt to be significant—and even a low level of UVA reaching the retina will result in damage over time.

FUTURE WORK

This review has focused on the current state of knowledge regarding UV-induced skin and eye damage. Future research should be directed towards understanding the mechanisms of UV-induced skin and eye damage, and developing effective UV protection strategies to reduce the risk of UV-induced skin and eye damage.
THE DYNAMICS OF PHOTO-AGING TO THE SKIN

Alteration of DNA
When sunlight enters the skin, it may alter nuclear components, including DNA. Although DNA is not a chromophore for UVA radiation, it can be damaged by photosensitization reactions that are initiated through absorption of UVA by unidentified chromophores.

UVB radiation primarily affects DNA through the formation of dimeric photoproducts between adjacent pyrimidine bases on the same DNA strand. There are extensive DNA repair mechanisms in human skin. However, the production of dimeric photoproducts may exceed the ability of the body to metabolize and neutralize them. In addition, reactive oxygen species may also lead to DNA damage—which provides a rationale for using antioxidants topically and as oral supplements.

Genetic Predisposition
Mutations on the genetic marker p53 seem to be an early event in UV-induced skin carcinogenesis, since p53 mutation is found in nearly 50% of actinic keratosis (AK), a premalignant stage of squamous cell carcinoma (SCC).

THE DYNAMICS OF UVR DAMAGE TO THE EYE

The potential for eye damage from UVR depends on several factors: intensity, wavelength, site of damage, oxygen tension, chromophores, and defense mechanisms.

Factors Effecting Degree of Damage
Oxygen Tension
The more highly oxygenated a tissue is, the more susceptible it is to oxidative and photo-oxidative damage. The eye, and its structures have a high oxygen tension. The cornea is oxygenated through direct contact with the air and the aqueous. The retina has a very complex network of vessels that provide a rich blood supply and therefore a high degree of oxygen tension. Although the lens has no direct blood supply it is still sufficiently oxygenated to be damaged by photo-oxidation.

Acute and Chronic Effects of UVA and UVB
The two main acute skin reactions to UVR—sunburn and tanning—are harbingers of long-term skin and eye damage. The chronic reactions are photo-aging and skin cancer. In terms of skin health, UVB is the most mutagenic and cytotoxic band of the solar spectrum. It is the most damaging radiation, leading to pre-cancerous and cancerous lesions. By comparison, the phototoxic effects of UVA are much lower, although it penetrates much deeper into the skin and definitely contributes to photo-aging. Photo-aging of the skin manifests as fine wrinkling, roughness and color changes, sagging and scarring.

Oxidation
Both exogenous and endogenous chromophores absorb light energy and convert it to an impulse that is transmitted to the brain, where it is interpreted as an image. Ordinarily, both the endogenous and exogenous chromophores absorb UVR and prevent it from reaching the retina. Thus, they are protective against photosensitization. But with age, certain of these chromophores (yellow) are converted to xanthurenic acid, which leads to the production of reactive oxygen species that damage lens proteins. As the lens has no reparative mechanisms, this damage is cumulative and culminates in age-related cataracts. The retina itself has a number of protective mechanisms—(rhodopsin, melanin, A2E). With age, these are converted to lipofuscin that may promote photo-oxidative reactions, as well.

Defense Mechanisms
Finally, there are a number of defense mechanisms that are available to the eye that protect against photo-oxidation. These include antioxidant enzymes—such as superoxide dismutase and catalase—and the antioxidants including vitamins E and C, lutein, zeaxanthin, lycopene, glutathione, and melanin. Again, these, too, diminish with age, but, fortunately, can be replaced by supplementation.

The Lens
The epithelial layers of the lens is in contact with the aqueous and reactive UVR directly, thus becoming susceptible to photo-oxidative effects. Photoreactivity in the inner layers of the lens involves changes in DNA and certain amino acids, as a result of damage to lipids and/or the main intrinsic membrane protein. These processes are all cataractogenic.

The Retina
The small amount of UVR radiation that is not filtered by the cornea and lens can cause damage to occur in retinal pigment epithelial cells, the choroid, and the outer segments of the rods and cones. If phototoxic damage is extensive, permanent blindness can occur—possibly as a result of AMD, which can be a result of UV damage that accumulates each day over a lifetime.

Chromophores
The UVR filter of the lens absorbs 20% of the 280-320 nm range. Different layers of the cornea absorb different ranges. The outer and inner membranes absorb 0.5% each. The corneal matrix absorbs 3%. The sclera and conjunctiva absorb 4%. The uveal tract absorbs 3%.

Site of Damage
Cornea and Uveal Tract
The epithelial and endothelial cells of the cornea are susceptible to damage from intense UVR and UVB light, which cause keratitis. However, these cells have an excellent repair mechanism, so that damage is rarely permanent. In contrast, the iris pigmented epithelial cells of the iris and the melanocytes of the uveal tract (which are highly pigmented), are significantly protected against damage, unless there is long-term exposure or aging of the cells.

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To help organize and consolidate the opinions of the UV-Glare Roundtable participants regarding a consensus statement, the moderator divided the panelists into two groups and asked them to address the following questions:

1. What are the most important points around which there is general agreement or consensus?
2. What are the most important points around which there is disagreement?

The opinions and conclusions reached by the panelists were presented by a spokesperson for each group. A summary of these panel discussions (held after the formal presentations) provided the information about UV and glare cited above.

Interestingly, Drs. Hebert and Judelsohn, reporting for each group, both said that there was very little disagreement among the panelists on the major issues. They pointed to the panelists' agreement that:

"The increasing incidence of UV-related eye and skin diseases, and the public's inadequate sun-protection behavior comprise ... programs that will increase public awareness about the dangers of UVR and foster better UV-protection practices."

In addressing the first question, the UV and Glare Roundtable participants unanimously agreed that the UV-eye disease connection is not well recognized among non-eye care health professionals, including family practice (FP) and general practice (GP) clinicians, dermatologists, and pediatricians. In this regard, Dr. Hebert suggested to the panel that the dermatologists' assessment of the relationship between eye disease and UVR may need to be updated. In contrast, eye care professionals are aware of the association between UV exposure and damage to vision, but they may not be automatically delivering a strong or consistent message to their patients about the need for UV eye protection. The panelists stressed that education needs to begin with these health professionals so that they gain a better understanding about the dynamics of UV-induced eye damage and are equipped with the tools necessary to educate their patients.

Moreover, the panelists emphasized that education of all healthcare professionals, as well as the public, should be a multidisciplinary effort, with the initiative being spearheaded by the ophthalmic community regarding UV-eye protection, and by dermatologists concerning UV-skin protection. Dr. Steinm suggested that one reason for a multidisciplinary approach is that eye care professionals do not get to see most of the people who use some form of UV protective eye wear, because most of it is obtained over the counter. Therefore, there is little chance for counseling by an eye care specialist. The panelists were in agreement that ophthalmologists and dermatologists need to provide eye care that goes "beyond 20/20" and addresses quality-of-life issues affected by glare and UV exposure.

Educating Healthcare Professionals

The UV and Glare Roundtable participants recommended that dermatologists need to learn more about the type of eye wear necessary to provide a high level of UV protection. Especially important, the ophthalmologists on the panel proposed that when patients present with one or more apparently sun-induced skin lesions, the dermatologist should consider overexposure of the skin as a potential etiology and that the dermatologist must start with the patient to convince the patient to use sun protection to avoid any UV-induced skin damage. Such multidisciplinary referrals, as Dr. Hamada noted, provide the opportunity for optimum vision care for all patients. However, an education and awareness campaign is needed for dermatologists to implement these protocols, so that they approach patients with a concern for UV protection of the eyes as well as the skin. The panel emphasized that such an educational program should be provided by the ophthalmology, optometry, and dermatology associations, in order to promote UV protection as a true multidisciplinary effort.

Educational programs about UV and eye health are equally important for primary care clinicians—including pediatricians, GPs, and FPswho are likely to be the young patient's main healthcare provider for many years. Such programs can be implemented through continuing medical education (CME) efforts directed at physicians, optometrists, nurses, physicians assistants, and nurse practitioners.

**Impact of UVR on Patients with Special Needs**

UVR affects everyone—regardless of age, or ethnicity. The degree of risk may be greater in certain groups, including young children, people with sun-reactive skin types, people taking photosensitizing medications, people who work or play outdoors, or people who reside at high altitudes. People with existing eye disease or conditions are at greater risk of UV eye damage.

Moreover, there is a common misconception that dark-skinned people need less protection from the sun. Yet, they are as susceptible to UV eye damage as are lighter-skinned people. In fact, the Internationa1 Project of the World Health Organization (WHO) clearly states that "darker skin provides no protection against UV effects on the eye and immune system."10

Conversely, melanoma is highly virulent when it occurs in dark-skinned people. This points, again, to the need for all people to practice adequate UV protection.

**Children**

There are increased risks of high degree of exposure to UVR during childhood. Children have immature skin cells that are still developing, thus they are more susceptible to UV damage. They also tend to have a greater percentage of exposed body surface area. Thus risks, although ubiquitous to children, are compounded by geographic location, obviously becoming greater in the Sunbelt and anywhere with increased exposure to highly reflective surfaces such as sand, water, snow, and evergreen. Keep in mind that young eyes have less capability to filter UVR than adult eyes, and thus, eyes demand greater protection at the earliest possible age.17

**Diabetics**

Diabetics may be particularly susceptible to UV damage. Due to an accumulation of scotopic and during adolescence, is compounded by young people’s tendency for lack of caution and unprotected sun exposure behavior.

In addition, young people get eye care perhaps as little as 20%–30%. Unless there is an evident eye problem, examinations are usually limited to visual acuity testing by the primary care physician or pediatrician. Of those who do wear prescription glasses, very few in the US use protective eye wear for more than just eye glare protection. This is probably due to a lack of awareness concerning the deleterious effects of UVR on the eye. Ironically, parents, who wear sunglasses or photochromic lenses, do not usually consider sun protection for their children.18

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The UV and Glare Roundtable panelists agree that educational initiatives should not stop with clini-
cians, but should be extended to school administra-
tors, nurses, teachers, coaches, counselors, summer
camp and youth organizations—indeed, any
professionals who work with the young—through
their respective professional organizations. These
programs should emphasize the need for early
implementation of preventive eye and skin care
measures to mitigate the cumulative effects of UVR.

Educating Patients

In addressing the second question, the UV
and Glare Roundtable discussion highlighted the need
for healthcare providers to offer patient education on
UVR protection during infancy, starting with the
parents. In this context, Dr. Brunson said that,
"This entails of the parents is a real opportunity
because they often do something for their children
that they won’t do for themselves. And if we can
move the role that parents can have in terms of
preserving the sight of their children into old age,
that certainly will have an impact on long-term eye health.”

Direct education of the patient may begin at about
age 4, as part of routine examinations. Dr. Judelsohn
suggested that education on UVR protection, which
at present is primarily focused on the skin, has to
move beyond just the skin. He added that this
education should be accompanied by specific and
concise suggestions about sun exposure habits and
sun protection, for both eyes and skin with perhaps
a more intense effort by geographical location, par-

cularly, the Sunbelt. The panel called attention to
reinforcing the message about the dangers of UVR and
good sun-protection practices to adolescents, a
group whose sun exposure habits and attitudes put
them at great risk for UV damage of vision and skin.
On this note, Dr. Neumann noted that pedi-
atrian’s offices usually have patient literature
flyers and brochures on a wide variety of medical
subjects, but very little on UV protection for the
eyes. As a solution to this lack of critical eye care
information, the panel recommended that efforts at
patient education need to be reinforced by
patient information materials developed as

single or as a multidisciplinary initiative by various
professional organizations including:

• The American Academy of Pediatrics (AAP)
• The American Academy of Dermatology (AAD)
• The American Academy of Ophthalmology (AAO)
• The American Academy of Family Physicians (AAFP)
• The American Optometric Association (AOA)
• The National Eye Institute (NEI)

In addition to these US-based professional health-
care associations, a number of international organi-

dations have been instrumental in providing educa-
tional programs on UVR protection for the eyes and
skin. In many of these programs, including those
in the US, the major emphasis is on skin protec-
tion; therefore, education on eye protection needs to
be amplified.

Creating Public Advocacy

The initiative for promoting public policy on UV
protection for the eyes may have to begin with the
ophthalmic community—both ophthalmologists
and optometrists—through their respective

GLOBAL UV-PROTECTION PROGRAMS IN THE PUBLIC AND PRIVATE SECTOR—RESOURCES ONLINE

The potential detrimental consequences of over-
exposure to UVR are experienced globally, and
that numerous public and private organizations
around the world have initiated sun-protection programs and/or produced educational literature
on the subject. Some of these are presented here as
a resource and guide for putting UV-protection campaigns into practice.

UVR-EDUCATION PROGRAMS

In the US

In 1998, the Skin Protection Federation was formed in the US as a coalition of
nonprofit organizations, including the American Cancer Society (ACS),
government agencies, and corporations to inform the public about protecting
themselves from the sun. The Federation adopted the Slip! Slop! Slap! message
used in Australia.21

The American Cancer Society began a Sun Safe Community initiative in
December of 2000 to help prevent skin cancer. This program consists of community-based prevention programs at schools, childcare centers, primary
health care offices, and buses and recreation areas. In 2002, Vecto Beach, Florida
implemented the ACS Sun Safe Program with a modified message: Slip, Slop, Slap,
and Wrap (wrap on a pair of sunglasses).22

In Australia

An example of a successful public UVR-education campaign, known as
Slip, Slop, and Slap-Slip on a T-shirt, Slop on some sunscreen or sunblock,
and Slap on a hat—has been used in Australia. This program, which began
in 1980, eventually became the SunSmart campaign and has been successful in
promoting the message to school children. It is, in fact, mandatory for
these children to wear protective clothing and hats to school, and to put
on sunscreen before being allowed to participate in outdoor activities. In the
early years of this program, however, the use of UVR eye protection had been
underemphasized.23

After twenty years, more Australians are practicing sun protective
behaviors, and are also detecting skin cancers earlier than previously.
Due to these efforts, there is a 50% reduction in skin cancer rates, as well as
decreases in nonmelanoma skin cancer rates in those under
age 4.24 The current program also recognizes the need for eye
protection.25 It has become a model for other programs now beginning to be
implemented throughout the world.

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themselves from the sun. The Federation adopted the Slip! Slop! Slap! message
used in Australia. In 2000, the Skin Protection Federation became the Skin
Protection Alliance (SPA) and initiated a collaborative effort to develop
public policy recommendations on UVR protection for the eyes and skin.

In 2001, the US Federal Trade Commission (FTC) issued an advisory to
the industry that "Eye care specialists have to be educated that "20/20 is not
enough.” New approaches to eye care must emphasize total quality-of-life issues
including:

• UV protection
• Elimination of glare that compromises vision,

Eye Wear Recommendations

• Improved visual quality, as well as quantity of
vision, (ie, better contrast sensitivity)

• Comfort and convenience that will increase com-

pliance with UV-protective eye wear guidelines

• Protection from UVR and glare, use of sunscreens, family outreach programs, resource allocation, and evaluation of program implementation.

Public policy should involve environmental man-
agement and urban planning that provide UV pro-
tection (including shade structures) and set sun
exposure schedules in a variety of settings including:

• School playgrounds
• Recreational facilities
• Public parks and gardens
• Outdoor work areas

In particular, children’s outdoor activities should be
duplicated in school and at home, and the use of
UVR-protective eye wear—eye wear that filters UVR and eliminates
glare, and the use of wide-brimmed hats—should be
encouraged.

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UVR-protective eye wear—eye wear that filters UVR and eliminates
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encouraged.
The incidence of UV-induced skin and eye diseases is increasing alarmingly. According to the InterSun Project of the World Health Organization, there are 2-3 million cases of nonmelanoma skin cancer annually throughout the world. Of the 16 million cases of blindness that are due to cataracts, about 3 million are probably caused by overexposure to UVR. It is predicted that a 10% decrease in the ozone layer over time will result in an additional 1.6-1.75 million cataract cases, 300,000 nonmelanoma skin conditions, and 4,500 melanoma skin cancers. Yet the InterSun Project also estimates that there would be a 70% reduction in the frequency of skin cancer with regular use of sunscreen (SPF 15+) by individuals under the age of 18. Furthermore, if UV-eye-protection practices were widely followed, there would be a decrease in the risk of conditions such as UV-induced age-related cataract. According to statistics provided by Dr. Lichtenstein, estimations suggest that a 10-year delay in the onset of age-related eye disease would reduce the cataracts in elderly by half, spanning up to 18 million individuals. A 20-year delay would reduce the number to one-sixth of current projections.

The existing educational programs in the US and abroad, while commendable, are small and scattered, and thus, need to be expanded. They are models for national programs that can and should be implemented on a wide scale in the near future. A multi-disciplinary approach would be the best way to reach health care professionals and the general public, but to gain greater compliance with current recommendations, the message may need to be one of cosmetics and being “cool,” in addition to one of eye safety.