Ultraviolet Radiation: Recognizing Hidden Potential for Injury

Kathryn D. Taylor, MA, LAT, ATC

ATHLETIC trainers and therapists (ATs) deal with injuries each day, and a large part of our job is attempting to prevent injuries. We often forget to protect our athletes and ourselves from one of the most persistent sources of harm to body tissues: the sun. Researchers estimate that one out of every 50 people may be diagnosed with melanoma in his or her lifetime, and there are 1–1.3 million cases of nonmelanoma skin cancers diagnosed each year. Diagnosis of melanoma, the most serious form of skin cancer, is increasing faster than any other preventable cancer in the U.S. Consequently, ATs should promote strategies to prevent skin damage.

Sun Exposure

Exposure to the sun is the greatest risk factor for skin cancers. The sun creates energy that travels to earth as invisible ultraviolet (UV) light. Approximately 95–98% of this radiation is categorized as UV-A, which penetrates deeply into the tissue layers and is responsible for most phototoxic drug reactions. The remainder is categorized as UVB, which is responsible for most sunburn reactions.

Ultraviolet light can affect DNA, resulting in gene mutation and cell death. Its effect on DNA can lead to dysplasia and skin cancers. Studies have demonstrated that both chronic exposure and intense intermittent exposure can create damage that leads to various skin cancers. This risk potential affects both outdoor and indoor athletes and begins in early childhood. Sun exposure during childhood, especially when intense and intermittent, is a significant risk factor for melanoma and basil cell carcinomas and appears to have greater effect than adult exposure.

The intensity and amount of UV radiation required to induce sunburn varies among individuals. Those with fair skin, light colored hair, a history of sunburn, and/or limited exposures to sunlight have increased susceptibility to damage from UV radiation. Individuals using photosensitizing drugs also will have increased susceptibility to skin damage from UV radiation.

Many athletes train, practice, and compete in outdoor sports that present a high level of UV radiation exposure. These athletes should be educated about the dangers of UV radiation and preventive measures that can protect against skin damage. Although an athlete may not experience sunburn, UV radiation still causes damage to the skin over time. Body areas frequently exposed to

Key Points

- Athletes are at a high risk for ultraviolet radiation exposure that can lead to skin cancers.
- Understanding these risk factors and having education and resources available will help reduce the incidence of sunburn and skin cancers in this population.
- Athletic trainers should establish early detection, education, and prevention measures into daily practice.

the sun present elevated risk for development of skin cancers, which include the head and neck, dorsum of the hands, forearms, and legs. Winter-sport athletes are at risk for excessive UV radiation exposure due to training at high altitude and light reflection from snow and ice-covered surfaces. Extreme UV exposure in outdoor sports such as skiing, mountaineering, cycling, or triathlon has been documented.

**Sunburn**

Sunburn is defined as an intense, delayed, and transient inflammatory tissue response to overexposure to sunlight UV radiation. The body’s natural defense against sunburn is melanin, which is produced by skin cells called melanocytes. Sunburn occurs when UV radiation exposure exceeds an individual’s melanin production capability. At least one sunburn affects 30–40% of adults and 70–80% of adolescents in the U.S. each year. Sunburn is most common between the ages of 18 and 24, and increased risk of sunburn is associated with high-risk behaviors such as smoking and alcohol consumption.

**Sunscreen**

Epidemiologic research has demonstrated that the correct use of sunscreen can significantly decrease the incidence of precancerous and cancerous lesions. A 2005 survey documented that 33.6% of respondents never wore sunscreen on sunny days. Another survey found that 31% of adolescents (11-18 years of age) wear sunscreen. Despite public health warnings about the risk, probably less than one-third of the athletic population is regularly wearing sunscreen.

The National Council on Skin Cancer Prevention has issued several recommendations for safe sun exposure (Table 1). Sunscreen with a Sun Protection Factor (SPF) rating of at least 15 should always be used when outdoors, and it should be reapplied at two-hour increments (or more frequently after swimming, toweling, or sweating). Cloudy or cool days do not provide protection from UVB, which passes through clouds, and lack of heat sensation on the skin does not indicate the absence of UV radiation.

The SPF rating of a sunscreen is a widely misunderstood concept. An SPF 50 rating does not prevent burns 2/3 times longer than an SPF 30 rating. The SPF rating represents the ability of a product to prevent the reddening and inflammation skin response to UVB exposure. For example, an SPF rating of 15 provides 15 times greater duration of protection compared to exposure without the presence of sunscreen. The SPF rating represents an approximation of the multiples of the expected time for appearance of a minimal skin reaction in an unprotected state (10 minutes x SPF 15 = 150 minutes or 2.5 hrs). It estimates the number of minutes a person can spend in the sun without a skin reaction if the sunscreen is properly used. Factors such as cloud cover, humidity, sweating, and water exposure can influence the amount of time that protection is provided. An SPF rating lower than 15 is not likely to provide a substantial degree of UV protection.

Most people do not apply and reapply a sufficient amount of sunscreen to achieve the full SPF approximation of protection time. The average adult should

---

**Table 1. The National Council on Skin Cancer Prevention Recommendations for Safe Sun Exposure**

- Do not burn; avoid sun tanning and tanning beds. Ultraviolet light from the sun and tanning beds causes skin cancer and wrinkling. Consider using a sunless self-tanning product to simulate the appearance of having been in the sun, but continue to use sunscreen.

- Generously apply sunscreen to all exposed skin using a Sun Protection Factor (SPF) of at least 15, which provides broad-spectrum protection from both ultraviolet A (UVA) and ultraviolet B (UVB) radiation. Reapply every two hours, even on cloudy days and after swimming or sweating.

- Wear protective clothing such as a long-sleeved shirt, pants, a wide-brimmed hat, and sunglasses where possible.

- Seek shade when appropriate, remembering that the sun’s rays are the strongest between 10 a.m. and 4 p.m.

- Use extra caution near water, snow, and sand as they reflect the damaging rays of the sun, which can increase the chance of sunburn.