

How Much UV Protection Does Clothing Provide?

Patients need to cover up when spending time outdoors, but research shows that when it comes to UV protection, all garments are not created equal.

By Jonathan Wolfe, MD

Dermatologists know that certain hats and clothing can block UV radiation and diminish exposure to harmful rays. However, the degree of protection afforded by clothes and accessories varies based on material, style, and conditions. These are important considerations for physicians educating patients about comprehensive sun protection. To make sun protection suggestions that are reasonable—i.e., not too costly or time consuming and do not hinder enjoyment of outdoor activities—dermatologists must have a sense of the true protection provided by various materials and gear.

Recent Findings

Recent encouraging findings regarding sun protection via clothing come from Australia, where a national SunSmart program encourages UV-avoidance strategies (including hat-wearing) among school children. To determine the quality of protection provided by various hat styles, researchers affixed UVR-sensitive polysulphone film patches to various locations on rotating head forms then topped these with different styles of hats and exposed them to UVR.¹ Not surprisingly, broad-brimmed and bucket hats provided the most protection for six different sites on the face and head, while legionnaires hats provided less but nonetheless satisfactory protection. Baseball caps, however, did not provide adequate protection to many facial sites.

But hats are an imperfect form of protection. The study determined that



the highest UVR protection factors (UPF—measure of UV blocking power of clothing, comparable to SPF) for any hat at any site were in the eight to 10 range. Therefore, the authors urge concomitant use of other forms of photoprotection along with hat-wearing.

Also as part of the SunSmart program, some Australian schools are erecting shade structures at playgrounds in efforts to minimize UVR exposure for children at play. When researchers used polysulphone film to measure the protection provided by 29 of these structures in New Zealand during the typical lunch-break hours, they calculated UPF factors of four to eight.² While the team noted that this protection would be acceptable for brief lunch-hour exposure, they concluded that only six of the 29 structures would provide UPF of 15 with prolonged exposure.

General Guidelines

As evidenced by the recent study, cloth-

ing/accessories can provide some protection against UVR but are best considered one element of a comprehensive sun protection strategy. Previous studies have investigated the protection provided by garments, with the combined weight of these findings offering a basis for sound patient recommendations:

1. Choose darker colors and synthetic fabrics for greater UPF. Plain white cotton tee shirts provide minimal protection from UVR. When researchers measured UVR transmission through 28 white fabrics, they found that 19 of the samples offered less protection than a sunscreen with SPF 15.³ Estimates suggest that about one-third of commercial summer-weight clothing provides an SPF below 15.⁴ Fabrics permit transmission of more UVA than UVB.⁵

Cotton fabrics dyed with natural colorants derived from plants or insects provided better UPF than colorless cotton; darker hues provide the highest UPFs.⁶ Shrinkage that results from standard laundering with detergent and water actually improves UPF slightly.⁵ Polyester fabrics provided higher levels of protection compared to cotton.³

2. Avoid wetting light-colored cotton fabrics. Many patients don a cotton tee shirt before diving in the pool or ocean in hopes of protecting against UVR. However, typical cotton fabrics, when wet, may provide even less protection than when dry. In one study comparing the effects of tap water and salt water on various materials, researchers found varying effects of wetness on materials.⁷

Table 1. Sources for UV-Protective Clothing

The following manufacturers/vendors manufacture or market sun-protective clothing.

Coolibar, Inc.	www.coolibar.com
Sun Clothing, Etc.	www.sunclothingetc.com
Sun Protective Clothing, Ltd.	www.sunprotectiveclothing.com
Sun Solutions.	www.sunsolutionsclothing.com
For information on Rit SunGuard or to order on-line.	www.sunguardsunprotection.com

Generally, it did not matter what type of water was used. Linen, viscose, and polyester fabrics had higher UPFs when wet. Both cotton fabrics and polyester fabrics treated with titanium dioxide (TiO₂) had lower UPFs when wet. Modal fabrics treated with TiO₂ and polyester crepe fabrics treated with TiO₂ had significantly increased UPFs when wet.

3. Specialty UV-protection clothing may offer enhanced defense against UVR. No longer new to the market, specially manufactured sun protection clothing has been shown to provide greater protection against UVR than standard fabrics.^{4,8} These garments are manufactured with fabrics featuring tight weaves and/or incorporated chemical UV absorbers. These clothes should be tested and affixed with UPF ratings.

4. Consumer-applied UV absorbers can also provide benefit. Consumers now have access to UV-absorbing agents that can be applied to clothing through regular at-home laundering. Researchers determined that detergents with 0.1-0.3 percent Tinosorb can decrease the UV transmittance of cotton fabric by 10-fold with 10 washes.⁹ Higher concentrations of UV absorber yielded similar protection in just one wash cycle.

Another study found that a single treatment with Rit Sun Guard (containing Tinosorb FD) sustains a UPF of 30 through about 20 wash cycles.¹⁰ Appropriate UV-absorbers for at-home application will have the Skin Cancer Foundation seal of approval.

5. Clothing must provide adequate coverage. To provide best protection, hats must have a broad brim

and tight weave. Ball caps and visors offer limited if any added protection. When possible, patients should wear long sleeves and long-legged pants in appropriate fabrics to minimize UV exposure.

6. Clothing alone is not enough. Even when clothing provides a high UPF, patients must continue to use sunscreen for maximum UV protection. Remember that patients also need instruction on using, applying, and regularly re-applying sunscreens.

Education is Key

A recent survey of 207,776 Americans found that 39 percent of respondents had had at least one sunburn in the previous 12 months!¹¹ Sunburn prevalence (61 percent) was highest among those age 18 to 24 (this group was far more likely to have had a sunburn than those 45 to 54 years old). Across all age groups, higher income and higher education levels were positively associated with sunburn. Individuals reporting recent binge drinking were also more likely to report a sunburn.

These findings remind us that our education efforts must especially target

young adult patients. While sunprotective clothing may be more expensive relative to standard tee-shirts or ball caps, the data suggest that patients at highest risk for sunburn can afford these garments. Hopefully, sunprotective clothing will continue to become more stylish among the 18-24 year-old group.

Protective clothes and hats along with regular and appropriate sunscreen use should be an integral part of any sun protection strategy—particularly when individuals anticipate long-term sun exposure (at the beach, hiking, golfing, gardening, etc.). Patients must understand that not all hats and clothing provide adequate protection. Instruct them to look for clothing with a high UPF, consider treating the clothes they wear for outdoor activities with UV-absorbing additives, and to choose broad-brimmed hats and tight weave fabrics. ☞

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New In Your Practice

Warts That? With recent FDA approval of Polyphenon E Ointment 15% (Bradley Pharmaceuticals), you'll soon have access to a new drug for the treatment of genital and perianal warts. The active ingredient in Polyphenon E Ointment, 15% is a defined mixture of catechins extracted from green tea and shown to be effective for the treatment of external genital and perianal warts caused by certain strains of human papilloma virus. Polyphenon E Ointment 15% is expected to launch during the second half of 2007.