



## What Is Sun-Safe Clothing?



What's the best way to protect yourself from the sun's harmful ultraviolet rays (UVR), given that we need to work, travel, and sometimes play outside? Clothing is the most basic and generally the best means of sun protection. Not all clothing is equal, however, and some of it isn't actually very good at protecting us. So, what makes a piece of clothing sun-safe?

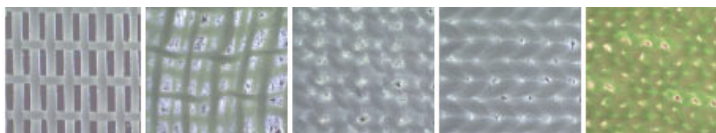
### More Is More

The sun damage done to every exposed part of your body is cumulative over your lifetime, continually adding to your risks of premature skin aging and skin cancer. So, to put it simply, the more skin you cover, the better. A long-sleeved shirt covers more skin than a T-shirt, especially if it has a high neckline or collar that shields the back of the neck; long pants cover more skin than shorts. A wide-brimmed hat protects more of the face than a baseball cap, and close-fitting wraparound sunglasses protect more of the area around the eyes than small lenses do. Cover up.

### Fabric Factors

Of course, you can have clothing over every square inch of your body, but if the sun goes right through it, it's not much use. Fabrics are made of tiny fibers woven or knitted together. Under a microscope, we can see lots of spaces between the fibers; UV can pass directly through these holes to reach the skin. The tighter the knit or weave, the smaller the holes and the less UV can get through. Twill, used to make tweeds or denim, is an example of a tightly woven fabric. Open weave fabrics provide much less protection.

Fabrics can be made from many types of fibers, including cotton, wool, and nylon. Most fibers naturally absorb some UV radiation, and some have elastic threads that pull the fibers tightly together, reducing the spaces between the holes. Synthetic fibers such as polyester, lycra, nylon, and acrylic are more protective than bleached cottons, and shiny or lustrous semi-synthetic fabrics like rayon reflect more UV than do matte ones, such as linen, which tend to absorb rather than reflect UV. Finally, consider the fabric's weight and density — light, sheer silk gauze will provide far less UV protection than heavy cotton denim.<sup>1,2,3</sup>



Average UPF: 3   Average UPF: 9   Average UPF: 30   Average UPF: 60   Average UPF: 115

*Five examples of real fabrics, all with different amounts of fiber or yarn per unit of surface area and providing different amounts of sun protection. The higher the UPF (ultraviolet protection factor), the greater the protection.*

### Color Comparisons

Most of our clothing is dyed attractive or functional colors. Many dyes absorb UV, which helps reduce exposure. Darker colors tend to absorb more UV than lighter colors, including whites and pastels, but bright colors such as red can also substantially absorb UV rays.<sup>3</sup> The more vivid the color, the greater the protection;

a bright yellow shirt is more protective than a pale one. But even a pale fabric can offer good protection if the weave, material, weight, etc. are effective at keeping out UV. And many white fabrics have “optical whitening agents,” chemical compounds that strongly absorb UVR, especially UVA.<sup>1,2</sup>

## UPF Rating

Though loosely evaluating fabric content, color, weight and weave by eye are helpful at sizing up UV protection, it is difficult to pinpoint just how protective a piece of clothing is simply by looking at it. Holding it up to the light helps show how much light passes through, but this isn't ideal, because the human eye sees visible light but not UV radiation.<sup>2</sup>

One solution is to choose garments with UPF labels. UPF, a concept originally standardized in Australia in 1996, stands for ultraviolet protection factor, which quantifies how effectively a piece of clothing shields against the sun.<sup>4</sup> The label means the fabric has been tested in a laboratory and consumers can be confident about the listed level of protection. It is based on the content, weight, color, and construction of the fabric, and indicates how much UV can penetrate the fabric. For instance, a shirt with a UPF of 50 allows just 1/50th of the sun's UV radiation to reach your skin. This would provide excellent sun protection, in contrast to a thin white cotton T-shirt, which has a UPF of about <sup>5</sup>, which allows 1/5th of the sun's UV through — even more when wet. In studies done in Australia, lycra/elastane fabrics were the most likely to have UPFs of 50 or higher, followed by nylon and polyester.<sup>3</sup>

Today, systems for testing and determining UPF are similar around the world. In many countries, including the US, the ASTM International (formerly called the American Society for Testing and Materials) criteria for UPF assessment are used; UPF labels in the US often state that an item meets ASTM International standards.

Does all of this mean that everyone should specifically buy UPF-tested/UPF-labeled clothing, which most often carries a brand name? Is it so superior to everyday clothing that it is worth the extra expense and trouble to find? Not necessarily. Some items of clothing, such as denims and corduroys, are among the most sun-protective of all garments, UPF labels or not. However, a specially made high-UPF shirt, say, with long sleeves and a double layer of fabric at the shoulders — a high UV exposure area — might be constructed with a lightweight material that gives the wearer superior comfort and coolness as well as added sun safety. And the UPF label always adds a measure of certainty.

## Do-It-Yourself

As an alternative, consumers themselves can improve a piece of clothing's UPF. First, wash it. This generally makes the garment shrink slightly, closing up holes in the fabric that can let UV radiation in. Tests have also shown that you can wash in extra protection and raise the UPF with UV-filtering dyes and other additives.<sup>1,2</sup>

## Here are some key tips for buying and staying sun-safe with clothing:

1. Buy garments that suit your purpose. You don't need a heavy work shirt for the beach, but a longsleeved, tightly woven linen shirt can be both cool and sun-smart.
2. If you are buying elastic garments like leggings, make sure you purchase the right size — overstretching will lower the UPF rating.
3. Look for garments with a UPF of at least 30 so that you know you're getting effective sun protection.
4. Choose garments that cover more skin—there's no point in a high-UPF bikini. Instead, consider a rash guard or swim shirt. Made of lightweight, elastic materials like spandex, these athletic tops will cover your upper body without weighing you down. You can also have beach skirts or sarongs ready for when you leave the water.

5. Wash new garments made from cotton or cotton blends two or three times at least. This can often permanently raise the UPF rating due to shrinkage of the spaces between the fibers.
6. Select wide-brimmed hats (at least 3" in diameter) that shade your face, neck and ears.
7. When outdoors, seek out shaded areas under awnings or trees and minimize your time in the direct sun.
8. Be aware that UV light can bounce off surfaces such as water, snow and glass, hitting your skin twice and increasing the intensity of exposure.
9. Use UV-filtering sunglasses and sunscreen with a sun protection factor (SPF) of at least 15 for everyday incidental exposure and 30 or higher for extended exposure. Apply sunscreen on all exposed areas — clothing can't cover everything.<sup>5</sup>

Remember, sun-protective clothing doesn't have to be boring: it can be light and bright and fashionable and fun. And when chosen and used correctly, it's the best form of sun protection you can find.

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