

Selecting Sunglasses to Protect Against UV Rays

What are ultraviolet rays?

Before discussing the relationship between ultraviolet rays and the eyes, do you know why ultraviolet rays are so called? Light and heat travel to the Earth from the sun, and ultraviolet rays constitute one type of ray involved in this process.

7 prismatic colors of light and ultraviolet rays

No doubt you will all have seen rainbows that appear when the weather clears up after a rainfall or when you are spraying water on your garden. A rainbow is a phenomenon that results from light from the sun being divided into the 7 prismatic colors of red, orange, yellow, green, blue, indigo and violet when it passes through moisture in the air. These colors are called "visible rays" because of their visibility to the human eye.

However, these are not the only light rays that travel to the Earth from the sun. There are also rays that fall outside the range of "visible rays" that are invisible to the human eye. Two typical examples of these invisible rays are "ultraviolet rays" and "infrared rays."

Why are "ultraviolet rays" so called?

The reason the term "ultraviolet rays" was coined is simply that, as the term implies, this kind of light is "beyond (ultra) the range of violet light."

Light is composed of electron waves called magnetic waves and the colors red, orange, yellow, green, blue, indigo and violet that occur in order of the length of the space (wavelength) occurring between these waves are reflected in the human eye. The 7 prismatic colors of a rainbow are also aligned in this order. These colors represent the "visible rays" mentioned earlier. Colors with wavelengths longer or shorter than these seven are invisible to the human eye.

Ultraviolet rays have a wavelength even shorter than violet, the visible ray with the shortest wavelength of all, and this is why the term "ultraviolet" is used; i.e. beyond (ultra) violet. This is where the term "UV," an acronym for Ultra-Violet comes from, and it can be seen in expressions such as "UV-cut," an ultraviolet ray-blocking function applied to cosmetic products, for example. Rays with wavelengths longer and, therefore, beyond the red wavelength are called "infrared rays."

What effects do ultraviolet rays produce?

There are three different types of ultraviolet ray, classified beginning with the shortest wavelength into "UV-C," "UV-B" and "UV-A,"

[UV-C]

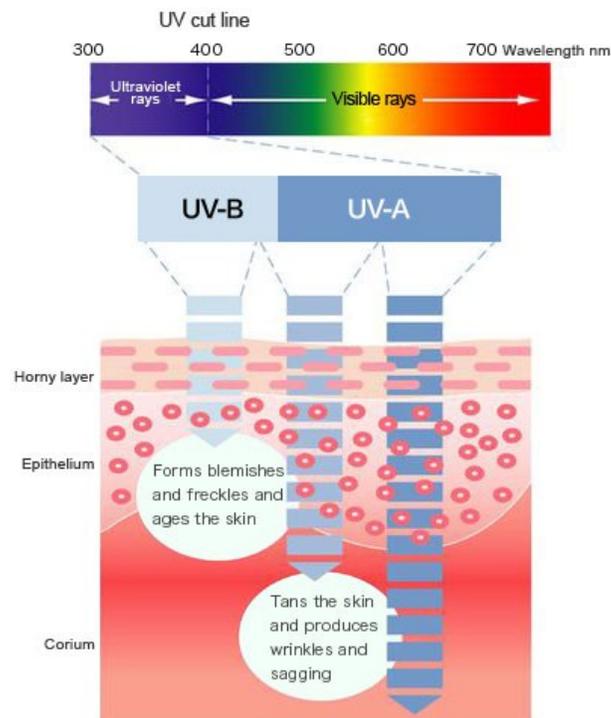
UV-C rays are absorbed by the ozone layer and almost never reach the ground.

[UV-B]

This type of ultraviolet ray makes the skin red. It is also absorbed by the cornea on the surface of the eye, and is known to be a cause of corneal inflammation.

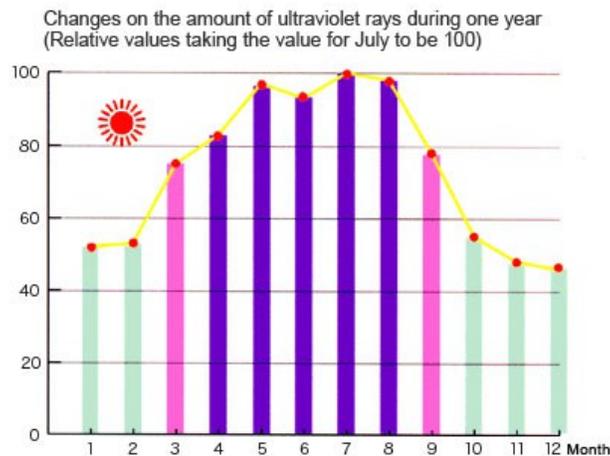
[UV-A]

This type of ultraviolet ray tans the skin and penetrates to the crystalline body, an organ at the back of the eye that serves as a lens. Prolonged continued absorption of UV-A results in oxidation of the crystalline body and formation of proteins, gradually producing a white cloudiness. UV-A has, therefore, become known as a cause of cataracts.



Furthermore, ultraviolet rays entering the eyes also have serious effects on the skin. Even though the skin may not be exposed, the eyes sense the penetration of ultraviolet rays and subsequently send signals throughout the body. This results in the formation of melanin pigments to resist the ultraviolet rays, producing a state identical to that which occurs when the skin itself is directly exposed. This gives us an idea of the extent of the effects of ultraviolet rays on the health of both the eyes and the body. Incidentally, although ultraviolet rays are at their peak in early summer, their effects can also be felt in other seasons, as shown in the graph below. We need to be sure to take measures to protect ourselves from

ultraviolet rays not only during the summer, but throughout the entire year.



Points to bear in mind when selecting sunglasses for specific situations

Outdoors

We will be exposed to greater amounts of sunlight in places like beaches or in the mountains than in our ordinary daily lives. At the beach, the eyes are exposed not only to direct sunlight, but also to light reflected from the surface of the sea or the sand. The amount of ultraviolet rays increases in proportion to increases in sunlight.

When mountain climbing, you should also bear in mind that the amount of ultraviolet rays increases the higher you climb.

Although the air absorbs ultraviolet rays from the sun, air becomes thinner at higher altitudes in the mountains, for example. In the same way, the higher the altitude, the lower the atmospheric pressure. For this reason, the amount of ultraviolet rays is greater at the top of a mountain than at the base.

Outdoor sunglasses

In terms of protecting the eyes from ultraviolet rays, sunglasses with small, slim frames are less suitable for outdoor use where they will be exposed to vigorous activity. Such sunglasses allow ultraviolet rays to penetrate the eyes through the gap between the face and the sunglasses. Wraparound sunglasses with large frames that extend around the sides of the eyes are recommended to effectively block ultraviolet rays.

Driving

Sunglasses are essential for driving in environments with exposure to strong sunlight. To protect our field of vision from midday sunlight or bright glare from the setting sun so that we can drive safely, sunglasses are an essential consideration. In addition, since it is not possible to select shaded spots when driving, ultraviolet rays are also a concern. When driving, we are

apparently exposed to greater amounts of ultraviolet rays than we imagine due to exposure not only to direct sunlight, but also to light reflected from the road, for example.

☐ Sunglasses for driving ☐

In terms of protecting the eyes from ultraviolet rays, sunglasses with small, slim frames are also less suitable for driving, a process during which the driver frequently needs to turn his/her head in various directions. Such sunglasses allow sunlight to penetrate the eyes through the gap between the face and the sunglasses. Oversized sunglasses that provide a wide field of vision so that the driver can perform actions such as checking side mirrors are recommended for driving. Wraparound sunglasses that cover the sides of the eyes will protect the eyes from exposure to sunlight from the sides while driving.

