

# UV Radiation

This fact sheet explains the types of ultraviolet radiation and the various factors that can affect the levels reaching the Earth's surface. The sun emits energy over a broad spectrum of wavelengths: visible light that you see, infrared radiation that you feel as heat, and ultraviolet (UV) radiation that you can't see or feel. UV radiation has a shorter wavelength and higher energy than visible light. It affects human health both positively and negatively. Short exposure to UVB radiation generates vitamin D, but can also lead to sunburn depending on an individual's skin type. Fortunately for life on Earth, our atmosphere's stratospheric ozone layer shields us from most UV radiation. What does get through the ozone layer, however, can cause the following problems, particularly for people who spend unprotected time outdoors:

- Skin cancer
- Suppression of the immune system
- Cataracts
- Premature aging of the skin

Since the benefits of sunlight cannot be separated from its damaging effects, it is important to understand the risks of overexposure, and take simple precautions to protect yourself.

## Did You Know?

Ultraviolet (UV) radiation, from the sun and from tanning beds, is classified as a human carcinogen, according to the U.S. Department of Health and Human Services and the World Health Organization.

## Types of UV Radiation

Scientists classify UV radiation into three types or bands—UVA, UVB, and UVC. The ozone layer absorbs some, but not all, of these types of UV radiation:

- **UVA:** Wavelength: 320-400 nm. Not absorbed by the ozone layer.
- **UVB:** Wavelength: 290-320 nm. Mostly absorbed by the ozone layer, but some does reach the Earth's surface.
- **UVC:** Wavelength: 100-290 nm. Completely absorbed by the ozone layer and atmosphere.

UVA and UVB radiation that reaches the Earth's surface contributes to the serious health effects listed above; it also contributes to environmental impacts. Levels of UVA radiation are more constant than UVB, reaching the Earth's surface without variations due to the time of day or year. In addition, UVA radiation is not filtered by glass.

## UV Levels Depend on a Number of Factors

The level of UV radiation reaching the Earth's surface can vary. Each of the following factors can increase your risk of UV radiation overexposure and consequent health effects.

### Stratospheric Ozone Layer

The amount of UV rays the ozone layer absorbs varies depending on the time of year and other natural events. Additionally, the ozone layer is thinner than it used to be due to ozone-depleting chemicals used in industry and consumer products. These chemicals are being phased out, but the ozone layer is not predicted to heal to pre-1980 levels until mid- to late-century.

### Time of Day

The sun is highest in the sky around noon. At this time, the sun's rays have the least distance to travel through the atmosphere and UVB levels are at their highest. In the early morning and late afternoon, the sun's rays pass through the atmosphere at an angle and their intensity is greatly reduced.

## Time of Year

The sun's angle varies with the seasons, causing the intensity of UV rays to change. UV intensity tends to be highest in the summer.

## Latitude

The sun's rays are strongest at the equator, where the sun is most directly overhead and UV rays must travel the least distance through the atmosphere. Ozone also is naturally thinner in the tropics compared to the mid- and high-latitudes, so there is less ozone to absorb the UV radiation as it passes through the atmosphere. At higher latitudes, the sun is lower in the sky, so UV rays must travel a greater distance through ozone-rich portions of the atmosphere and, in turn, expose those latitudes to less UV radiation.

## Altitude

UV intensity increases with altitude because there is less atmosphere to absorb the damaging rays. As a result, your chance of damaging your eyes and skin increases at higher altitudes.

## Weather Conditions

Cloud cover reduces UV levels, but not completely. Depending on the thickness of the cloud cover, it is possible to burn on a cloudy day, even if it does not feel warm.

## Reflection

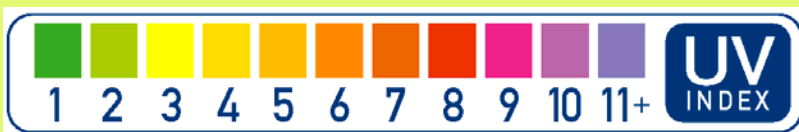
Surfaces like snow, sand, pavement, and water reflect much of the UV radiation that reaches them. Because of this reflection, UV intensity can be deceptively high even in shaded areas.

## EPA's SunWise Program

In response to the serious public health threat posed by exposure to UV rays, EPA works with schools and communities across the nation through the SunWise Program. SunWise teaches children how to protect themselves from overexposure to the sun. For more information, please visit [www.epa.gov/sunwise](http://www.epa.gov/sunwise).

### The UV Index

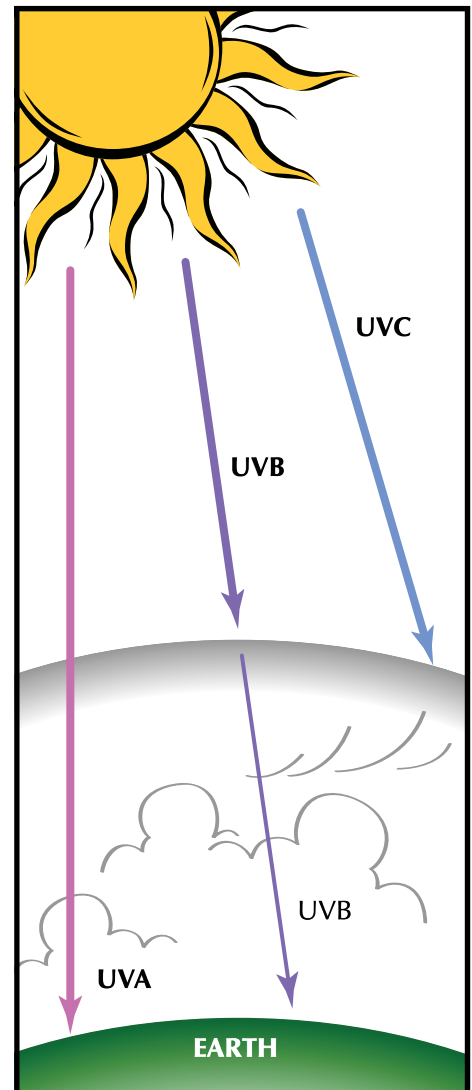
The UV Index forecasts the strength of the sun's harmful rays. The higher the number, the greater the chance of sun damage.



Visit [www.epa.gov/sunwise/uvindex.html](http://www.epa.gov/sunwise/uvindex.html)

## Be SunWise

- Do Not Burn
- Avoid Sun Tanning and Tanning Beds
- Use Sunscreen
- Cover Up
- Seek Shade
- Watch for the UV Index
- Use Extra Caution Near Water, Snow, and Sand
- Get Vitamin D Safely



The stratospheric ozone layer screens out much of the sun's harmful UV rays.