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# Sunscreen Use: How to Protect Ourselves without Compromising the Planet

## A Short History of Sunscreen

Ultraviolet (UV) light has been affecting living beings on Earth since the dawn of life, but it was not until the early 1900s that products such as sunscreens were conceived. In 1938, a young man by the name of Franz Greiter set out to climb Piz Buin, a mountain located on the stunning Swiss-Austrian border (Drissi et al., 2022). During his climb, Greiter unfortunately suffered from severe sunburns which was a result of poor sun protection and intense UV exposure due to the thin atmosphere of the mountain. Following this experience, Greiter decided to take it upon himself to come up with a solution to prevent sunburns. Thankfully, as a result of his knowledge from being a chemistry student, he was able to come up with one of the best inventions to shield humans from harmful solar radiation: the modern sunscreen.

## How Does UV Radiation Affect the Skin?

First, it is important to understand what UV light (or UV radiation) is. Put simply, UV stands for ultraviolet, a type of light that is primarily emitted by the Sun and that is invisible to the human eye (*Ultraviolet Waves*, n.d.). Although you cannot see it, you can feel UV radiation through its effect on your skin. There are also two types of UV lights:

- UVA, which has a longer wavelength, and is associated with skin aging
- UVB, which has a shorter wavelength, and is associated with skin burning

Common and proven consequences of prolonged UV light exposure include skin cancers (e.g., melanoma), premature aging, eye damage (e.g., burning of the cornea), and skin irregularities (Pontén et al., 1995; Gonzaga, 2009; Walsh, 2009). Most of these health conditions arise because UV light inflicts direct lesions upon cellular DNA, causing physical deformations that lead to functional abnormalities (Clancy, 2008). In simple terms, damaged skin cells lose their strength, vitality, and ability to regenerate healthily.



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## How Do Sunscreens Protect Us?

Sunscreens can contain multiple ingredients, but for them to provide any actual sun protection, they must contain a few specific ingredients.

**Mineral sunscreens** are composed of one of two main ingredients: titanium dioxide or zinc oxide (*The Science of Sunscreen*, 2018). These are both minerals that are found in soil, rocks, sand, etc., and in the production of sunscreens, they are ground into fine particles. Once applied on the body, they form a protective barrier that reflects UV rays away from the skin, similar to how a mirror reflects light away.

**Chemical sunscreens** are made up of organic chemicals such as oxybenzone, avobenzone, and octinoxate, which also create a protective barrier for the skin that absorbs UV light before it penetrates into the underlying skin layers.

## What Is SPF?

The famous abbreviation “SPF” simply stands for “sun protection factor”, and it is a measure of how much UVB radiation is required to produce skin damage (i.e., sunburn) on protected skin (Schalka and Reis, 2011). For example, if you are prone to getting sunburns after basking in the sun for 30 minutes, then a sunscreen with SPF 15 would allow you to stay in the sun without getting burned for approximately 450 minutes, or 7.5 hours. Please keep in mind that this is a very rough estimate and as the example shows, the length of sun protection will vary per individual. This is why the general dermatologist recommendation for everyone is “re-apply sunscreen every two hours” (Wilson et al., 2012). Better safe than sorry!

**Is a higher SPF truly better?** Dermatologists recommend using sunscreens with an SPF between 15 and 50. At higher numbers, the protective effect levels off (Ou-Yang et al., 2012); however, in high-UV areas (i.e., places high in altitude), sunscreens with higher SPFs will provide better protection especially when applied in typical consumer-sized amounts (more on this later).

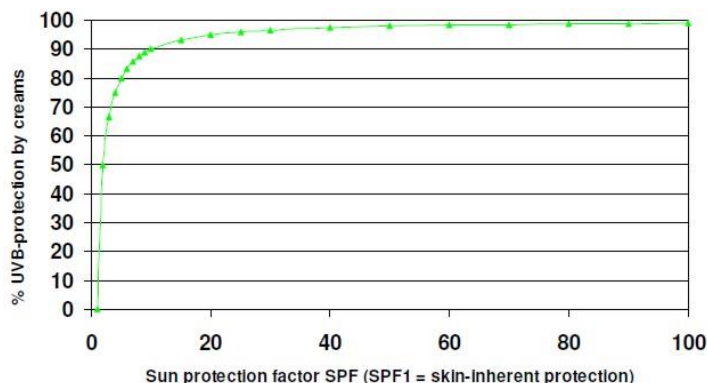


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## The Environmental Impact of Sunscreen

In recent years, a serious concern has been raised about sunscreens harming marine life, and one of the stars of popular news headlines are coral reefs. In the last decade, multiple studies have looked into coral reef bleaching, and some of the findings have been unclear and conflicting, but one thing is apparent: coral reef bleaching is triggered by multiple factors, and sunscreens alone. In fact, one of the main cause of bleaching is rising water temperature – a consequence of global warming (Adler and DeLeo, 2020).

Many other studies have nevertheless found that coral reef bleaching is exacerbated by one particular ingredient found in sunscreen and that is most commonly known as oxybenzone (DiNardo and Downs, 2018). It turns out that oxybenzone also impacts fish and dolphin health.

In sum, from the data that currently exists, a few ingredients have been found to be more dangerous for marine life than others. This includes oxybenzone, benzophenones and variants, OD-PABA, 4-methylbenzylidene camphor, 3-Benzylidene camphor, nano-Titanium dioxide, nano-Zinc oxide, octinoxate, and octocrylene (US Department of Commerce, n.d.).

## How Should One Select a Safe Sunscreen?

Besides marine life, certain ingredients found in sunscreens have also been found to have potential negative effects on human health, and namely, the human endocrine system (EWG's Guide, n.d.). These include oxybenzone, octinoxate, homosalate, and avobenzone.

**Making a Choice.** When it comes to choosing a safe sunscreen, the general consensus is that mineral sunscreens (like titanium dioxide and zinc oxide) are better choices than chemical sunscreens for both the environment and our health.



## Recommendations

Sunscreens act as a defense tool against harmful UV rays, and just like any other tool, it is most effective when used correctly. Unfortunately, many public health studies show that many consumers use sunscreen ineffectually, and this means that many of us remain unprotected (Addor et al., 2022). Below is a summary of recommendations for maximizing sun protection:

- **Most consumers use very small quantities of sunscreen.** Use generous amounts and re-apply every two hours for maximal protection. As a reference, it is recommended that you use ¼ teaspoon of sunscreen on your face alone. See what that looks like and replicate the feel and effect with the rest of your body.
- **SPF makeup does not provide sufficient protection.** Most makeup products that promise sun protection contain very small amounts of protective ingredients and oftentimes at SPF 15 or lower. Wear sunscreen underneath your makeup.
- **All sunscreens protect against UVB light, but not all protect against UVA.** Go for “broad spectrum” sunscreens as these provide protection against both types of UV light.
- **Higher SPF is not necessarily better unless you are at risk for intense UV exposure.** The ideal SPF range is between 30-50, and higher than 50 if you plan to venture into higher altitudes.
- **UV light is also in effect in winter.** Although sunscreen use is strongly associated with summer and sunny days, it should be used even in winter and on cloudy days.
- **UV light is strongest between 10 am and 4 pm.** Avoid venturing outside for too long during this time, and if you cannot avoid it, ensure that you are properly protected.
- **UV light is not limited to the external environment.** Buildings and closed spaces receive UV light from the outside through windows. Wear sunscreen even if you are spending time inside.
- **UV light can damage any skin even if sunburn does not occur.** Wear sunscreen even if you do not get sunburns and follow the same application guidelines as noted above.
- **There are other ways to protect yourself.** Wear full-length clothing, hats, and sunglasses whenever outside and whenever possible.
- **Visit <https://www.ecolivingguide.ca> for [product choices](#).**

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