



Sunscreens

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Introduction

With the summer holidays approaching, many South Africans will flock to the coast, or at the very least, spend time outdoors in the sun. The sun provides warmth and light which enables plant growth. Sunlight also improves mood and is used by the human body to produce vitamin D. Unfortunately, ultraviolet (UV) rays from the sun are also responsible for sunburn, photoageing and skin cancer. In this article, we will discuss sunscreens and how they should be used to obtain the best protection from UV exposure.

Ultraviolet radiation

UV radiation is energy that comes from the sun, but is not visible to the eye. UV radiation has the ability to cause a disruptive effect on the skin cells.

The UV spectrum can be divided according to its wavelengths as follows:

- UVC: 200-290 nm
- UVB: 290-320 nm
- UVA2: 320-340 nm
- UVA1: 340-400 nm

UVC rays are filtered out by the ozone layer and do not reach the earth's surface. Approximately 5% of UV rays that reach the earth are UVB rays. UVB rays cause sunburn, hyperpigmentation and skin cancer. UVA rays account for approximately 95% of the UV radiation that reaches the earth's surface. UVA is thought to penetrate deeper into the skin and cause photoageing and pigment darkening, and may also be involved in skin cancer.

Sunscreen

Sunscreen is a topical preparation that contains filters that reflect or absorb radiation in the UV wavelength range. Broad-spectrum sunscreens are produced by combining filters that absorb UVB and UVA radiation.

These filters are classified as organic and inorganic.

Organic filters

Organic filters absorb UV radiation and convert it into

small amounts of heat. An organic filter absorbs UV light in a specific wavelength. Cinnamates and salicylates absorb UVB. Octinoxate, a cinnamate, is the most widely used UVB filter worldwide. Benzophenones absorb UVB and UVA2. Oxybenzone is commonly used. Avobenzone absorbs UVA1, but needs to be stabilised with other compounds.

Inorganic filters

Inorganic filters are mineral compounds, such as zinc oxide and titanium dioxide, that are able to reflect and scatter UV light in the UVB and UVA range. They are stable and have a low potential to cause an allergic reaction. Products that use a larger particle size may form an occlusive white layer on the skin. Nanotechnology has been utilised to produce tiny particles which form a transparent film on the skin.

Sun protection factor

The sun protection factor (SPF) is a measure of the sunscreen's ability to protect against UVB. It is the ratio of how long you can be in the sun before burning when you are protected by the sunscreen, compared to not being protected by it. For example, if it takes 10 minutes for your skin to turn red without sunscreen, using a sunscreen with an SPF of 15 will prevent the skin from turning red for 15 times longer. That is 10 minutes x 15 = 150 minutes or 2.5 hours.

Ultraviolet A protection

Broad-spectrum sunscreen protects the skin from UVA and UVB. The UVA protection level refers to the ratio of UVA to UVB protection, and is required to be at least one third of the labelled SPF. Therefore, as the SPF increases, so will the UVA protection.

Previously, the South African National Standard certified that the ratio of UVA to UVB protection in broad-spectrum sunscreen should be 0.4:1. However, newer research found an increased correlation between UVA exposure and malignant melanoma, leading to the need for sunscreens with improved UVA protection. The new South African Standard, which was approved in April 2013, requires the ratio of UVA to UVB protection in broad-spectrum sunscreen to be at least 0.33:1.

The Cancer Association of South Africa (CANSA) introduced the CANSA SunSmart seal. In order for a sunscreen to qualify for the CANSA SunSmart seal, it must be broad spectrum, pass the South African National Standards tests and/or similar international standards, and comply with certain criteria developed by CANSA.

From 2005, sunscreens with the original CANSA Seal of Recognition logo were broad spectrum and provided UVA to UVB protection in the ratio of 0.4:1. However, CANSA now requires that any sunscreen manufactured after 31 March 2013 must comply with the new UVA to UVB radiation protection of at least 0.33:1. Sunscreens that qualify will exhibit the new CANSA SunSmart Choice seal logo which replaces the CANSA Seal of Recognition to differentiate between the older and newer formulations. A list of sunscreens approved by CANSA can be found on its website: <http://www.cansa.org.za/cansas-seal-of-recognition-protection-category/>

Everybody is at risk of the adverse effects of UV radiation and can benefit from sunscreen use. Sun protection is especially important for those with light skins, who are more susceptible to sunburn. Failure to prevent sunburn is usually caused by the way in which the sunscreen is applied, rather than the inadequacy of the product.

The correct use of sunscreen

The correct use of sunscreen includes the following:

- Sunscreen should be applied to sun-exposed skin approximately 20 minutes before going into the sun. This allows for water or volatile liquids to evaporate, leaving a uniform distribution of the UV filters that cover the skin.
- Sunscreen is absorbed by the skin and does not need to be rubbed in.
- The correct amount of sunscreen must be applied. When the SPF value of sunscreen is tested, 2 mg/cm² is used. This is approximately 30 ml or two tablespoons for an average-sized adult.
- The head, neck and each arm should receive half a teaspoon of sunscreen apiece. The front of the torso, the back and each leg should receive just more than a full teaspoon per body part.
- When applied correctly, the amount of UVB absorbed by SPF 15, 30 and 50 is 93%, 97% and 98%, respectively. Individuals typically apply less sunscreen than they should. For example, if between a half and a quarter of the required amount of a sunscreen with an SPF 20 is applied, the SPF will be reduced to an SPF of 5-10, or lower. Therefore, unless proper use is ensured, sunscreen with a higher SPF should be used. SPFs of 20-50 are usually recommended. SPF 30-50 is suitable for fair skin.

- Sunscreen should be reapplied at least every two hours, and after swimming, perspiring or towelling, even if the product is water resistant.
- Sunscreen must be applied to areas that are frequently forgotten, such as the back and sides of the neck, the ears, the temples, the backs of the hands and the top of the feet.
- Once opened, sunscreen should not be kept for longer than one year.

The sun protection factor in moisturisers and cosmetics

Incorporating sunscreen into moisturisers and cosmetics, such as foundation, is a good way of improving compliance with the application of sunscreen every day. However, the SPF rating of each product is not additive. If you are using a moisturiser with an SPF of 15 and a foundation with an SPF 15, then the total SPF sun protection given is not 30. The application of each product will give a sun-protective film, resulting in a closer approximation of SPF 15.

Conclusion

UV radiation is damaging to the skin. Measures to protect the skin include staying out of the sun between 10h00 and 15h00, staying in the shade as much as possible, covering up with clothing, wearing hats and UV-protective swimwear, and using sunscreen with an SPF of between 20 and 50 correctly.

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