

The Sun and I

Living in a tropical country, Malaysians enjoy the sun throughout the year. While some love this for its tanning effects, a part of the sun's rays is ultraviolet radiation (UVR) that can be harmful to our health. There are a lot of myths and misconceptions about UVR and sunscreens. A good in-depth knowledge of these can be lifesaving.

1. What are UVRs?

Ultraviolet radiations are present naturally from sun exposure as well as artificially via light-emitting sources. These are non-visible but may leave significant impact on the radiated part of the skin. There are 3 main types of UVR, namely UVA, UVB and UVC. They differ in terms of their depth of penetration as well as the effects on our skin.

UVA penetrates deeper than UVB. UVC are largely filtered by the ozone layer and hence, does not usually reach us. Glasses filter UVB but not UVA.

On a typical summer day, UVA makes up about 96.5% of the UVR, leaving UVB with the remaining 3.5%. UVB is the main cause of immediate sunburn and is associated with skin cancer. On the other hand, UVA is the main cause of aging and also is associated skin cancer.

Maximal radiation is typically between 10am to 4pm, with its peak at around 12-2pm.

2. How does UVR harm me?

The 2 main concerns of UVR are its cancer and skin-aging inducing properties. Despite increasing awareness to avoid the sun's rays, skin cancers are still a major concern. In 2011, there are about 70,000 cases of melanoma in the United States and about 12,000 of the sufferers die from it. UVA had been found to play a role in the development of melanoma. In addition, UVB had been found to be associated with squamous skin cancer.

On the aesthetics front, UVA causes accelerated aging. It is known to contribute to wrinkle formation, loss of skin elasticity, blotchy pigmentation and other wide arrays of aging related skin conditions. Adequate sun protection from a young age is advocated to slow down skin aging.

3. What are sunscreen?

Sunscreens are applicable products that help to prevent UVR from reaching the skin. It can be in the form of lotions, creams, oils, gels, sprays, sticks and cleanser. Selection of the formulations depends on the skin types as well as the ability for the formulation to spread well across the intended surface. Oils, creams and sticks tend to stay longer on the skin.

However, oils tend to spread out too thinly on the surface to exert the intended sun protection. Nowadays, sunscreens are also incorporated into skin cares and cosmetics. However, there are

limitations to what sunscreen can be incorporated into them and some of these compounds may be inactivated by other components in the skin care or cosmetics.

4. *What are the types of sunscreen?*

There are basically 2 types of sunscreen; physical and chemical sunscreens.

Physical sunscreens are barrier sunscreens that scatter or reflect UVR. This includes titanium dioxide, magnesium oxide, iron oxide and zinc oxide. Older formulations tend to require a thick layer of application, melt in the sun, stain clothing and can be comedogenic. Micronized preparation render them more translucent and more acceptable for daily usage. Physical sunscreens generally seldom cause skin allergy.

Chemical sunscreens absorb UVR and convert them into other forms of energy. They act like a filter as they absorb and reflect UVR. Some of the commonly used chemical sunscreens include Para-aminobenzoic acid (PABA), cinnamates, salicylates, benzophenones, menthyl antranilate, Parsol 1789, mexoryl and etc. Each chemical sunscreen may screen off specific spectrum of the UVR wavelength. Hence, a combination of sunscreen is needed to offer an adequate coverage of the whole UVR spectrum.

5. *How do we evaluate the efficacy of sunscreen's sun protection?*

For UVB, the efficacy of a sunscreen is expressed in terms of Sun Protection Factor (SPF). SPF represents the ability of a sunscreen to delay sun-induced skin redness as a result of UVB. For example, application of SPF 30 sunscreen on uncovered skin will allow the skin to stay in the sun 30 times longer without causing skin redness. Hence, the higher the SPF, the longer one can stay under the sun without getting red.

However, this is only true if sufficient sunscreen is applied. For UVA, UVA protection factor (UVAPF) measures the ability of the sunscreen to delay skin tanning as a result of UVA. A good sunscreen should offer good protection for both UVA and UVB. As a general rule, most local dermatologist will recommend a sunscreen of at least SPF 30 with UVA protection. It is important to know that no sunscreen can block off 100% of the UV radiation. Hence, sunscreen should also be followed with other measures such as sun avoidance, protective clothing and hats, window shields and etc.

6. *When do we apply sunscreen?*

Contrary of the common belief that sunscreen is to be applied only when you are out in the hot sun, regular application of lower-SPF products is more important and more effective than intermittent use of higher-SPF sunscreen. In fact, it is desirable to apply sunscreen daily as it helps to also protect against UVA rays transmitted indoors through glass and from unanticipated sun exposures.

Generally, sunscreen needs to be reapplied every 2-4 hourly or after sweating or soaking in water. At the minimum, it should be applied at least twice a day; once in the morning and once at noon. Sunscreen should be applied about 30 minutes prior to the exposure.

7. How much of sunscreen is needed?

Getting the right sunscreen does not equate to good sun protection. The amount of applied sunscreen is important to ensure that it exerts its intentional benefit. As a general rule, squeeze 2 strips of sunscreen from the last finger crest to the tip of the finger. This amount is needed to cover an average face and neck.

8. What is the role of anti-oxidant and anti-inflammatory substances in sunscreen?

As no sunscreen offers total protection, there will be some damage due to UVR even with the use of sunscreen. UVR harms via inflammation and generation of damaging oxidants.

Antioxidants neutralize oxidants generated due to the radiation and anti-inflammatory substances reduce the damages due to the resulting inflammation. With the reduction and inflammation and oxidative damage, the harms of UVR can be reduced. Hence, antioxidant and anti-inflammatory substances are often added into the sunscreen.

9. What is the main side-effect of sunscreen?

The main concern will be allergy to a substance in sunscreen. One can be allergic to the fragrances, preservatives and other added compound of the sunscreen. As for the active sunscreen compound, chemical sunscreen can cause allergy. This allergy is manifested as red, itchy and scaly rash over the area in contact with the sunscreen. This rash may or may not be exacerbated by sun exposure.

On the other hand, physical sunscreen doesn't cause allergy. It may be good to switch to physical sunscreen in patients with sunscreen allergy.

10. What are the important take-home messages on sunscreen?

Sunscreen is important to prevent skin cancer and delay skin aging.

A good sunscreen provides both UVA and UVB protection when applied adequately. Everyone should have the habit of applying sunscreen on a regular basis. Lastly, no sunscreen offers total protection. Sun avoidance, protective clothing and hats, window shield and other sun protection measures are needed on top of sunscreen usage.

Prepared by,

Assoc Prof Dr Irene Lee Chew Kek,
MBBS (UM), MRCP (UK), AM (Mal), Adv M Derm (UKM), AAAM (US)

Member of Dermatological Society of Malaysia

Head of school and associate professor
Anti-aging, Aesthetics and Regenerative Medicine,
Faculty of Medicine and Health Science
UCSI University

Consultant dermatologist
Laurent Bleu Clinic



***The above health information is published courtesy of Dermatological Society of Malaysia
(<http://www.dermatology.org.my/>)***