

# Eight questions on sun protection

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"What kind of sun cream would you recommend for me?" and "What is important when purchasing sun creams?" Your customers probably often ask such kind of questions during summer season. We have interviewed Dr Hans Lautenschläger on the effects and the ingredients of sun creams. So you are prepared for all kinds of questions on this issue.

## 1 Sun creams protect the skin against the damaging effects of UV radiation. How does it work on the skin?

The UV filters in the creams absorb the high-energy UV radiation of the sun and convert it into heat. This process avoids that aggressive radicals can form in the skin and that cell structures will be damaged.

## 2. There are UV-B and UV-A filters. What exactly is the difference and how do the filters work?

It depends on the specific chemical structure whether a filter absorbs long-wave UV-A radiation, the more short-wave UV-B radiation or both of them and re-emits it/them in the form of heat. UV-A radiation penetrates into the dermis, forms radicals and damages the collagen structures. There is a low risk for sun burns however there is risk for particular types of skin cancer. UV-B radiation arrives in the epidermis and is responsible for sun burns and an increased risk of skin cancer. UV-B radiation however also supports the melanin formation and thus prolongs the self-protection time.

## 3. The efficacy of sun protection preparations is evaluated with the sun protection factor (SPF). What exactly does SPF mean? Is it correct to conclude: the higher the SPF the better for the skin?

SPF 15, for instance, means that 93.3% of the UV-B radiation is rendered harmless, SPF 30 eliminates 96.7% and SPF 50 98% of the UV-B radiation. The remaining percentage of radiation is absorbed by the melanin in the skin. If you know how long you will be staying in the sun and estimate your self-protection time, you can easily calculate the required SPF. Just to give you an example: With a 4 hour stay in the sun (240 min) and a self-protection time of 20 min you would need a sun protection factor (SPF) of 240 divided by 20 equals 12. The closest SPF available is 15. Using a SPF 30 or even 50 in this case would be useless. It would

even reduce the melanin and vitamin D<sub>3</sub> formation which contributes to your self-protection time. It still is recommended to start sunbathing with short stays in the sun and then gradually increase the exposure.

## 4. What are the most important ingredients that sun creams should contain? Are there any ingredients you should pay particular attention to?

Besides UV-A and UV-B filters, sun creams contain lipophilic carriers – preferably in the form of oxygen resistant however biodegradable esters as well as polymeric filming agents that are permeable to water vapour. The latter mentioned will remain on the skin surface together with the filters without having occlusive effects and without accumulating the heat and causing skin swellings. In the case that emulsions are preferred which easily spread on the skin, the filters and carriers are mixed with an aqueous phase. This process can be effected by means of stable emulsifiers, consistency agents or membrane forming components ("free of emulsifiers"). Emulsifiers based on polyethylene glycols (PEG base) are not appropriate as they form harmful chemical compounds (peroxides) in combination with high-energy light. Sensitive natural substances and vitamins should also be avoided.

## 5. Nanoparticles in sun creams are controversially discussed. They reflect the sun on the one hand but could affect the somatic cells. What is your opinion to the issue: how harmful are they in fact?

Nanoparticles with a particle size of 100 nm or smaller have to be declared as nanomaterial according to the decree EC1223/2009 of the EU Cosmetic Directive, effective since 11.07.2013. They are subject to strict requirements. In order to avoid these strict requirements, most of the manufacturers concentrate on a particle size over 100 nm or use synthetic filters. There have been no reports on damages caused by zinc oxide or titanium dioxide

nanoparticles. On the other side, there are no reliable studies that can exclude potential harms at a 100% as it is impossible to examine all the theoretically possible scenarios.

**6. What kind of declarations is used for sun creams? Which should definitely appear on the labels?**

In the case that besides UV-B protection, also UV-A protection of at least one third of the labelled UV-B protection is guaranteed, the manufacturers are allowed to add the UV-A symbol on the label of the preparation. This symbol consists of the three letters "UVA" in a circle. The manufacturers also have to include a warning that infants and toddlers should not be directly exposed to the sun. It is also important to indicate that the unavoidable infrared radiation (IR) takes a heavy toll on the skin. The IR radiation significantly contributes to the premature skin aging process. That is why only moderate sun exposure is recommended.

**7. How long does your sun cream protect you against UV radiation? How often should you reapply your sun protection cream?**

It depends on the individual consumer behaviour. If consumers apply the cream appropriately (2 mg cream per cm<sup>2</sup>), the self-protection time can be multiplied with the sun protection factor and the result then will inform on the time the consumer can spend in the sun. A reapplication of the cream after expiration would be useless. The situation is different when the preparation has partly been removed due to water sport activities, sweating or textiles. Then the preparation should occasionally be reapplied.

**8. What is the usual shelf life of sun creams?**

As with other cosmetic products, the shelf life of sun creams depends on the physical, chemical and microbiological stability. The filters used in the past sometimes were chemically unstable or were affected by sun radiation when applied on the skin. Today it should be safe for consumers to observe the shelf life and the open jar symbol.