

Are sunscreens safe?

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Many dermatologists worldwide consider sunscreen to be the most important over-the-counter topically applied product for skin health. Sunscreens are now found in facial moisturizers, lipsticks, lip balms, facial foundations, face powders, and hand creams. Sunscreens are the basis for the antiaging claims made by many pricey boutique facial wrinkle reducing products. In addition, sunscreens are supposed to prevent aging, sunburn, tanning, and skin cancer. The ubiquitous nature of sunscreens has caused many critics to ask if sunscreens are truly safe. Several consumer groups have developed a website following by posting sunscreen safety concerns based on claims that sunscreens are both proestrogenic and carcinogenic. Thus, dermatologists must confront the safety of sunscreens in a scientific and logical manner.

It may be helpful to examine the history of sunscreen development as a beginning to investigating the sunscreen safety issue. The original sunscreens were commissioned to prevent heat stroke and debilitating sunburn in military personnel who worked long hours in the sun on the deck of aircraft carriers. Many of these carriers were stationed in the intense sun around the equator and recruits were falling sick with the reflected sun from the shiny ship deck. The recognition of this need stimulated research in the development of a product that could be topically applied to the skin to decrease sunburn, which was the birth of sunscreen.

The first sunscreen was red veterinary petrolatum. While it provided modest UVB photoprotection, it was not terribly effective and lacked in aesthetic appeal. The search for new sunscreen ingredients resulted in the development of PABA, a better UVB photoprotectant, but unfortunately PABA stained white clothing yellow and was also a source of contact dermatitis. Since that time more UVB photoprotectants, such as octyl methoxycinnamate, have been developed that do not stain

clothing and provide better UVB protection. More modern sunscreen formulations contain ingredients such as photostabilized avobenzone, oxybenzone, microfine zinc oxide, and micronized titanium dioxide that offer both UVB and UVA photoprotection with excellent aesthetics and no clothing staining and rare contact dermatitis.

Modern developments in formulation certainly have increased the ability of sunscreens to prevent sunburn and allow persons with fair skin to stay outdoors longer, but sunscreens do not prevent tanning. Every dermatologist has heard a patient express wonderment at the tan they achieved while wearing a sunscreen on a beach outing. Sunscreens were never developed to prevent tanning. They were developed to extend the ability to remain in the sun before painful damage occurred to the skin. Newer sunscreen formulations are extending UVA photoprotection capabilities with the organic filters encamsule and avobenzone, but it is still possible to tan while wearing a sunscreen.

Since sunscreens are generally incomplete UVA photoprotectants, it is not surprising that some critics state that sunscreens actually increase the incidence of skin cancer by allowing extended sun exposure. Indeed, this may be true, but sunscreens were never developed to prevent skin cancer. In fact, there is no evidence that sunscreens prevent skin cancer in humans. We assume this is true because UVA is a tumor promoter able to increase the incidence of skin cancer in rodents. It would be impossible to do a longitudinal double-blind placebo-controlled study to determine if sunscreen prevents skin cancer for ethical reasons, so the assumption of skin cancer prevention may go unproved.

Sunscreens are also touted to prevent aging. Most antiaging formulations include a sunscreen, which is the active agent to support the antiaging claim. However, sunscreens have never been proved to prevent aging. It makes sense to assume that less sun exposure will result in less skin aging, but no one knows if wearing sunscreen decreases sun exposure sufficiently to reduce

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skin aging. New evidence indicates that visible light and infrared radiation also cause skin aging and these wavelengths are not blocked by all sunscreens. Some critics argue that sunscreens promote aging by allowing increased sun exposure. Perhaps sunscreens are antiaging when sun exposure is required, but are not antiaging when intentional overexposure is desired. Thus, it may appear that the antiaging efficacy of sunscreens depends on the dose of sun and their intended use. Sunscreens are antiaging at low sun doses and proaging at high sun doses, presenting an uncomfortable dichotomy.

Perhaps sunscreens are not as safe as dermatologists contend. Indeed, the safety of sunscreens has recently been called into question by several consumer groups purporting that sunscreens are proestrogenic and cause cancer. Much of the data to support these contentions comes from studies where rodents were fed massive amounts of sunscreen. Humans do not ingest sunscreens on a regular basis, but inadvertent ingestion of minute amounts over a lifetime is purported to have a cumulative effect. Children may be more at risk than adults because of the increased possibility of ingesting sunscreen through hand sucking and the relatively higher dose ingested because of a lower body mass. It is possible to recover octyl methoxycinnamate, the most widely used UVB filter in the current marketplace, from the urine of adults. This systemic absorption is thought to come from skin penetration rather than accidental oral ingestion. Thus, it appears that more systemic absorption is possible when sunscreen is applied to a larger body surface area. Clothing over most of the body with sunscreen only applied to exposed areas, such as the face and hands, might minimize systemic levels and prevent problems, which as of yet are poorly understood.

Given the issues that have been discussed in this editorial, how dermatologists had to insure the safe use of sunscreens? Certainly, sunscreens had not been viewed as the perfect prevention for sunburn, tanning, aging, and photocarcinogenesis. Sunscreens simply increase the dose of UVB that can be sustained before

experiencing sunburn. Nothing more has been proved. With this in mind, perhaps dermatologists had to consider how to counsel patients on safe sunscreen use. I would recommend the following:

1. Only wear sunscreen-containing products during the day when sun exposure may occur. Do not use sunscreen-containing moisturizers at night. Buy a separate product for night-time application, cutting the sunscreen exposure in half.
2. Do not use sunscreens on children less than 6 months old where the ratio of body surface to body mass is high. Keep these infants out of the sun. The current warning label on sunscreens supports this safety need.
3. Only apply sunscreen on areas of the skin that will be exposed to sun and not under clothing. Remember that clothing provides the best and safest photoprotection. Wear as much clothing as possible to minimize the body surface area covered by sunscreen. Select tightly woven clothing that does not allow the penetration of sun.
4. Avoid ingesting the sunscreen when possible. Use specialized sunscreen-containing lip balms that minimize oral ingestion on the lips and not regular sunscreens. Select opaque lipsticks as lip sun protection that does not contain organic filters. Wash the sunscreen off lips before eating and when sun exposure has ceased.
5. Wash the palms of the hands after applying sunscreen to avoid accidental ingestion when handling food. Avoid touching the skin covered with sunscreen at all times, but especially before the sunscreen has dried in place.

There is nothing in life that is thoroughly safe, including the use of sunscreens. Everything must be assessed in terms of a risk/benefit ratio. Sunscreens have a very low risk/benefit ratio, but research is needed to better understand the protection of skin from the sun. The sun gives life and the sun takes away from the beauty of the skin. Protection is vital and dermatology must lead the way in the development of better photoprotection methods that are truly safe.