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Key Inforbits

- Summer Sun Safety Tips
- Risk Factors for Increased Harm
- Ultraviolet Radiation
- Understanding Sunscreen
- Skin Cancer
- Have a question?

10 Tips for Summer Sun Safety

Use water resistant, broad spectrum sunscreen with a Sun Protection Factor (SPF)

- Broad spectrum offers protection against ultraviolet (UV) rays. Use SPF of 15 or more.

Apply 15 minutes before you go outside

- Doing so allows the sunscreen to have enough time to provide the max benefit.

Apply generous amounts to all uncovered skin

- Especially places such as your nose, ears, neck, hands, feet, and lips - avoid putting it inside your mouth and eyes.

Reapply sunscreen at least every two hours

- Make sure to apply more often if you're swimming or sweating. At least an ounce of sunscreen is needed to cover the body, which is about the amount of a shot glass.

Sunscreen is not recommended for infants

- Infants (<6 months old) are at greater risk of side effects, such as rash. The best protection is to keep infants out of the sun entirely.

Limit time in the sun

- Especially when the rays from the sun are most intense, between 10 a.m. and 4 p.m..

Wear clothes to protect skin from the sun

- These items include long-sleeve shirts, pants, sunglasses, and broad-brim hats. Sun-protective clothing is also available and regulated by the FDA if they are intended for medical purposes.

Protect your eyes

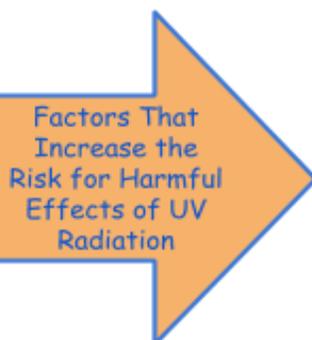
- Sunglasses that are labeled with a UVA/UVB rating of 100% are best to get the most UV protection.

Remember to protect your head

- If you do not have much hair on your head make sure to apply sunscreen or wear a hat.

Be careful around surfaces that reflect the sun's rays

- These surfaces include sand, water, concrete, and even snow.^{1,2}



- Long periods of natural or artificial exposure
- People with pale skin and freckles
- People with blond, red, or light brown hair
- Those who have been treated for skin cancer
- Those who have a family member who has had skin cancer¹
- Some medications, common ones include tetracycline, doxycycline, voriconazole, amiodarone, hydrochlorothiazide, naproxen, piroxicam and chlorpromazine - make sure to ask your healthcare provider if your medication increases sun sensitivity³

* Remember, people of all skin colors are at risk for harmful effects, so always protect yourself.¹

Ultraviolet (UV) Radiation



- UV rays come directly from the sun as a form of electromagnetic radiation, which can penetrate into the skin, depending on the level of energy the rays possess. These rays can cause damage to DNA in cells and, thus, lead to skin cancer.
- UV radiation is divided into three groups classified as UVA, UVB, and UVC rays. UVA rays have the longest wavelengths and least amount of energy. They have been linked to skin aging, such as wrinkles, as well as some skin cancers. UVB rays are shorter than UVA wavelengths and have slightly more energy than UVA rays. These are the main rays that cause sunburn and are thought to lead to most skin cancers. Additionally, UVB is the only radiation that SPF blocks. UVC has the shortest wavelengths and the most energy. Because these rays typically react with the ozone layer and don't reach the ground, they aren't associated with skin cancer.⁴
- It is important to note that UV rays can result in eye problems. The cornea can become inflamed or burned and cataracts and pterygium can also form leading to impaired vision.⁴ This is why wearing sunglasses with 100% UVA/UVB protection is crucial.
- To determine how much UV radiation to which you are exposed, just look for your shadow. In the early morning and late afternoon, your shadow is taller than you which means your UV exposure is lower. Around midday, your shadow is shorter than you which means your UV exposure is higher. The amount of UV radiation that touches the Earth's surface, and enters the epidermal layers of the skin, depends on factors such as the sun's height in the sky, latitude, and altitude. UV ray intensity is directly related to the angle of the sun above the horizon, and can be noted when the sun is at its highest point in the sky.⁵
- Can UV rays be good for you? Yes - in one sense they can have health benefits! When your skin is exposed to UV radiation it creates vitamin D, which can fight disease and reduce the risk of cancer. However, an optimal vitamin D level has not yet been established, and research is still underway in establishing the benefits of vitamin D. It is recommended to get vitamin D from your diet and vitamin supplements, as opposed to the sun, since these factors do not pose a risk of skin cancer, as UV rays do.⁴

UV Index ⁵		
Exposure Category	UV Range	Tips
Low	<2	No protection needed.
Moderate	3 to 5	Seek shade late morning to mid-afternoon. Use broad spectrum sunscreen and wear protective clothing.
High	6 to 7	
Very High	8 to 10	Be careful outside. Seek shade and wear protective clothing, wide-brimmed hat, and sunglasses. Generously apply broad spectrum sunscreen with a minimum of SPF-15.
Extreme	11+	

SPF vs % UVB Protection ⁶	
SPF 15	93%
SPF 20	95%
SPF 30	97%
SPF 60	98%

Understanding Sunscreen



Sun Protection Factor (SPF): This value shows the level of sunburn protection provided by the product. Sunscreens are tested to assess how much UV radiation exposure is required to cause a sunburn when using a sunscreen as opposed to the amount of UV exposure that is needed to cause a sunburn without sunscreen. Values that are higher, up to 50, generally produce better protection. It is important to note that since these values are established based on a test that measures protection against UVB radiation sunburns, SPF values can only demonstrate sunscreen's prevention against UVB radiation. A sunscreen with a SPF of at least 15 is needed to get the most protection. However, if you have fair skin, a higher SPF such as 30 or 50 is best. It is

also important to note that SPF is related to the amount of solar exposure not time of solar exposure, which is a common misconception.⁷

Broad Spectrum: Provides protection from UV radiation from the sun's rays. Broad spectrum sunscreen protects you from both types of UV radiations, UVA and UVB. It does this by producing a chemical barrier that absorbs or reflects the UV radiation before it gets the chance to damage the skin.⁷ UV rays are strongest from late morning through mid-afternoon, closest to the equator, during summer months, and at higher altitudes.² Broad spectrum sunscreen is recommended all the time, but especially in the cases previously mentioned.

Sunscreen Expiration Dates: There is no guarantee that expired sunscreens remain safe and completely effective and therefore should be discarded.⁷

Sunscreen Ingredients: Ingredients that are protecting our skin from UV rays are the active ingredients; the additional ingredients are inactive. Some common active ingredients include ensulizole, octisalate, homosalate, octocrylene, octinoxate, oxybenzone, avobenzone, titanium dioxide, and zinc oxide.⁷ Titanium dioxide and zinc oxide have been generally recognized as safe and effective (GRASE) by the FDA.⁸ There is evidence that some active ingredients may be absorbed through the skin and enter into the body. However, more research is needed to establish to what extent systemic exposure occurs.⁷

Safety of Sunscreen Ingredients: Two common sunscreen ingredients were recently banned in Key West and Hawaii because of their toxic effects on coral reefs and marine species. These ingredients include oxybenzone (BP-3) and octinoxate (OMC). Because of this ban, a recent meta-analysis including 29 studies evaluated the current evidence on the association between systemic levels of BP-3 and OMC and health outcomes and fetal development. This meta-analysis found no association between elevated systemic BP-3 and thyroid hormone levels because of lack of consistency between studies. There was also no association between BP-3 exposure and fertility. The effect of BP-3 on pubertal development was inconclusive. One of the studies included in the meta-analysis evaluated the effects of BP-3 on renal function in 441 female patients. There was a significant association found between BP-3 and the albumin-to-creatinine ratio, which could indicate that BP-3 might contribute to kidney injury. There was no significant association found between fetal development and prenatal BP-3 levels. Few studies have evaluated the effects of OMC on health outcomes. Reproductive and thyroid hormones were not significantly affected by short-term OMC application. OMC has relatively low skin penetration and absorption compared to BP-3. One study involving 17 postmenopausal females evaluated how much 10% BP-3 and OMC is absorbed after a whole-body application. After two hours the maximum median concentration of BP-3 was 187 ng/mL and OMC was 7 ng/mL. Overall, there was no causal relationship found between BP-3 and OMC with adverse health outcomes. However, a well-designed randomized controlled trial is needed to evaluate long-term safety of BP-3 and OMC.⁹

Skin Cancer

- **Malignant cells form in skin tissues to develop skin cancer.** Three types of cells make up the epidermis which is where skin cancer originates. These cells include squamous cells, which is called squamous cell carcinoma of the skin when cancer forms in it, basal cells, which is called basal cell carcinoma when cancer forms in it, and melanocytes, which is called melanoma when cancer forms in it.¹⁰
- **The most common skin cancer in the United States is nonmelanoma skin cancer.** This encompasses basal cell carcinoma and squamous cell carcinoma. Fortunately, most of these cancers can be cured. Melanoma is more rare, but is more serious since it is more likely to expand to neighboring tissues and other parts of the body and it is more difficult to cure. When found and treated early, melanoma is less likely to lead to complications and death. The amount of nonmelanoma cancer cases appear to have increased recently in the United States and melanoma cases have been rising for the past 30 years. This may be partially due to people becoming more aware and concerned about skin cancer and therefore are getting screened more often leading to an increased amount of diagnoses. However, the number of deaths from melanoma has been somewhat lower in the past few years, based on data from 2013-2017.¹⁰
- **The chance of developing skin cancer is influenced by different factors.** Risk factors are anything that increase your chance for developing cancer and protective factors are anything that decrease your chance for developing cancer. Some risk factors and protective factors are different for nonmelanoma skin cancer compared to melanoma. Risk factors specific to nonmelanoma skin cancer include having actinic keratosis, past radiation treatment, having a weak immune system, and being exposed to arsenic. Risk factors specific to melanoma skin cancer include having a history or multiple blistering sunburns, having several large or many small moles, having a family history of unusual moles, and being white. Additionally we know that UV radiation exposure is a risk factor for skin cancer and evidence has shown that individual skin sensitivity may also be a risk factor. However, it is unknown if the use of sunscreen, avoiding sun exposure or if chemopreventive agents lower the risk of nonmelanoma skin cancer due to lack of studies. Nor do we know for sure if sunscreen or counseling on protecting the skin from the sun lowers the risk of melanoma. Experts still recommend using sunscreen that protects against UV rays, wearing protective clothing and limiting time in the sun.^{10,11}
- **Current Evidence.** A systematic review that included four prospective studies published in February 2019 evaluated the role of sunscreen in preventing melanoma and nonmelanoma skin cancer. This review found that sunscreen is effective in preventing actinic keratosis and squamous cell carcinoma development and it may be effective against basal cell carcinoma and melanoma. Even after photodamage occurred, brief periods of sunscreen use were found to be highly effective in preventing actinic keratoses and squamous cell carcinomas. There was no strong preventative effect found for basal cell carcinomas, but this could be caused by the long promotion phase of basal cell carcinomas. Longer studies are needed to evaluate the effectiveness of sunscreen on preventing basal cell carcinomas.¹² Another systematic review and meta-analysis of one randomized trial and 28 observational studies, which included a total of 313,717 participants, showed no significant association between sunscreen use and the risk of melanoma and non-melanoma skin cancers (OR = 1.08; 95% CI: 0.91-1.28; I² = 89.4%). This study found that before the 1980s there was a strong



positive correlation between sunscreen use and the risk of melanoma (cumulative OR = 2.35; 95% CI: 1.66-3.33). Even in the 1990s, there was a positive association between sunscreen use and risk of cancer (cumulative OR = 1.25; 95% CI: 1.0- 1.56; p = 0.05). After the 1990s, the correlation was no longer as apparent. Overall, due to the inconsistency of results between the studies and retrospective design, the authors suggest that the quality of this evidence should be considered “low”.¹³ Lastly, a systematic review from 2016, which included one randomized controlled trial involving 1621 participants followed over four and a half years, sought out to determine if the use of topical sunscreen when compared to no specific precautionary tasks inhibited the occurrence of basal cell carcinoma and squamous cell carcinoma. The authors of this review found that the evidence was low and lacking in determining if sunscreen does in fact prevent basal cell carcinoma or squamous cell carcinoma. They also expressed difficulties in finding trials that met their inclusion criteria or that were focusing on similar outcomes.¹⁴ The results of these three studies show some conflicting information. All three of the studies are systematic reviews and therefore have a retrospective design. The first systematic review mentioned included only four prospective studies that were all published in the 1990s to the early 2000s which showed sunscreen to be beneficial in preventing squamous cell carcinoma, but not basal cell carcinoma. The second study mentioned above included 29 studies (one randomized control trial and 28 observational studies) and the range of publication dates was 1979-2016 which concluded that sunscreen did not show a difference in preventing melanoma or nonmelanoma skin cancers. The third study discussed only included one randomized controlled trial that showed no difference between the groups when looking at sunscreen use and the prevention of melanoma. This trial was considered to have “low” quality evidence. From this we see that more and higher quality studies are needed to evaluate sunscreen use and application, amount of sun exposure, use of other sun protection methods, and latitude on the impact of cancer risk.

Summary

In conclusion, as the summer months continue, it is encouraged that adopting sun safety practices be made a priority. With the high intensity of ultraviolet rays from the sun, it should be noted that a risk of skin cancer is a possibility for some.⁴ This potential outcome can be significantly reduced with the use of daily broad spectrum sunscreen and physical barriers. Although there is conflicting data with regards to the efficacy of sunscreen in preventing skin cancer, it should be encouraged to err on the side of caution and utilize sunscreen in response.^{12,13,14} The limited evidence in such a field calls for further investigation and a utilization of the current resources at our disposal.

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The Last “Dose” ...

“Drink your water, eat your veggies, wear your sunscreen.” - unknown

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