Friday Favorites: Does Sunscreen Cause or Prevent Skin Cancer Which Type Is Best to Use Transcript

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Sunscreen and Skin Cancer Evidence

Decades ago, studies started bubbling up reporting that not only was the use of sunscreen not found to be protective against skin cancer, but it was associated with significantly elevated risk. But, subsequent studies offered the obvious explanation of this paradox. People who use sunscreen are more likely to be sunbathers. That's like finding those who use motorcycle helmets are more likely to die in the highway. I mean, it's not that sunscreen and helmets aren't protective, it's just that they're associated with engagement in risky activities. But, you don't know until you put it to the test. As I noted in my last video, randomized controlled trials have shown that regular use of sunscreen can arrest visible signs of skin aging, including biopsy-proven reductions in UV-related skin damage. But, are there interventional trials proving sunscreen can prevent cancer? Yes.

Organ transplant recipients are highly susceptible to skin cancers because they have to be given immune suppressants to prevent organ rejection. A group of 120 organ recipients were equally informed about sun protection measures, but half were given free broad-spectrum SPF 50+ sunscreen for daily application to their head, neck, forearms, and hands. After 2 years, there were nine new basal cell carcinomas in the control group versus only two in the sunscreen group. That sounds good, but it may have just been a fluke.

Clinical Trials in High-Risk Patients

In contrast, there was a highly significant difference in the proportion of patients who got new invasive squamous cell carcinoma. Eight new cases in the control group versus zero in the sunscreen group. But, wait until you hear about what happened to their actinic keratoses, the precancerous growths that can turn into skin cancer. They all started out covered in them. A total of 191 detected in each group. In the subsequent 24 months, the control group developed 82 new ones. How many did the sunscreen group develop? -102.

More than 100 pre-cancerous growths in the sunscreen group spontaneously regressed and vanished completely compared to 82 new growths developing in the control group without a single one disappearing.

Their bodies, even in their immunocompromised state, could heal itself once it just stopped being bombarded with so many cancer-causing rays. Other randomized control trials have shown similar findings. But generalizability is limited. The studies all used high-risk populations. For example, those living in subtropical climates or with a personal history of pre-cancerous lesions. So, cancer prevention efficacy in the general population would be expected to be less.

On the other hand, the studies could also have underestimated the impact since they were relatively short-term, not exceeding 4 years, and ethically had to allow the control group participants to slather on their own sunscreen, which would dilute the difference between groups.

For maximum effectiveness, sunscreen needs to be applied properly, which apparently rarely happens in the real world. In a study of nearly 5,000 skiers and snowboarders, almost no one, only about 4%, were fully compliant with sunscreen recommendations. First, there's the amount. The FDA standard is 2 mg per square centimeter. What does that mean? Use the teaspoon rule.

How to Apply Sunscreen Correctly

One teaspoon for your face, head, and neck. One for the front of your torso, another for your back, one teaspoon for each arm, and two teaspoons for each leg.

That's a total of nine teaspoons. It's about the total volume equivalent of a golf ball or or a shot glass to help you

visualize it. Unfortunately, the average sunscreen user may only apply a quarter of the recommended amount. This is why high SPF sunscreens are often recommended, like, you know, 50+ SPF. Although the FDA recommends a minimum SPF of only 15 to prevent skin cancer under normal consumer conditions, even an SPF of 50 may effectively give you only an SPF of 12.5 because most people don't put on enough. Randomized, double-blind, head-to-head, split-face experiments where you're randomized to apply one sunscreen to one side of your face and another sunscreen to the other side show that in real-life use, SPF 100-plus sunscreen works significantly better than SPF 50-plus sunscreen. More than 50% of the participants were sunburned more on their SPF 50-plus side compared to only about 5% on their SPF 100-plus side.

Now, potential downside of higher SPF sunscreens is that they could provide a false sense of security. Those randomized with SPF 30 sunscreen ended up spending more cumulative time in the sun than those who receiving an SPF 10 sunscreen, [clears throat] as much as five times longer in some cases.

Uh, what else? Well, people tend to remember to use sunscreen on a sunny day at the beach, but sun protection is needed even on cloudy days since the UV rays are not dampened as much as visible light. There's even a phenomenon known as cloud enhancement, where overcast skies can sometimes result in even more UV reaching the Earth's surface compared to clear skies. Sunscreen labels often suggest waiting at least 15 minutes after application before going outdoors, uh, but when put to the test, sunscreen was found to start working immediately with the full effect apparent by minute 10. However, if water resistance is required, it may be prudent to wait the full 15 to 30 minutes after application before taking a dip. The terms waterproof or sweatproof appear to be meaningless marketing as no difference in retention was noted between {quote} waterproof products and those that were merely labeled water resistant.

SPF, Reapplication, and Product Types

Both were better than non-water resistant products, though, which lost nearly all their protective effects within 20 minutes of water immersion. The suggestion that sunscreen should be reapplied every 2 to 3 hours only applies under conditions in which it is rinsed off by water or sweat or rubbed off by friction from clothing or sand.

Even after allowing sunscreen to dry first for 20 minutes, between 15 and 60% of its protective effect can be lost after contact with sand. Otherwise, if the recommended amount is applied and the sunscreen layer is not disturbed, SPF can be maintained for as long as 8 hours.

What kind of sunscreen should you use? Cream-based is preferable to spray-on since the completeness of application is more readily visualized. To help with adequate coverage, spray-on sunscreen should be rubbed on immediately after spraying. Aerosolized sunscreens are flammable and can combust on skin upon exposure to an open flame even after the sunscreen has dried. What's more, the safety of breathing in aerosolized sunscreen chemicals has not been adequately studied. Though frankly, the same thing could be said about rubbing them on your skin.

The concerns surrounding sunscreen safety are threefold. Increased intentional sun exposure, vitamin D deficiency, and untoward effects from systemic absorption of sunscreen chemicals.

In the 1800s, we first learned that UVB caused sunburns and formulated sunscreens to block it. Nearly a century later, we learned about the contribution of UVA. Now, a full century later, we are realizing that infrared and visible light may also be contributing cancer and premature skin aging.

Sunlight comes to us in three major bands: visible light, ultraviolet, and infrared. Visible light includes the colors of the rainbow, red, orange, yellow, green, blue, indigo, and violet, or ROYGBIV.

Ultraviolet, UV, is to the right of violet in ROYGBIV, and infrared to the left of red. Sunscreen can protect us against the free radical damage of UV, but half of the free radical formation in our skin from the sun may be from the visible or infrared spectrums which sunscreens may not adequately cover.

Safety, UV Bands, and Mineral Sunscreens

So, that's where sun avoidance strategies come in. But, you can imagine how shade seeking could be undermined by the solacement of a sunscreen security blanket. What about vitamin D? The theoretical concern about sunscreen affecting vitamin D status does not seem to manifest in the real world, likely because the UV dose necessary for vitamin D production is so low well before skin turns a pinker shade. However, concerns about the systemic absorption of sunscreen chemicals were underscored by the recent FDA bombshell that not a single one of sunscreen chemicals in current use can be considered generally recognized as safe. Only two active ingredients got the green light. The two non-chemical mineral sunscreens, titanium dioxide and zinc oxide. The regulation was based on a growing body of evidence that transdermal, meaning through the skin absorption of sunscreen chemicals was greater than we previously thought, raising unevaluated safety concerns. Unevaluated because we previously didn't think so much got into our bloodstreams. In 2019, a study published in the Journal of the American Medical Association found that under maximum usage conditions over a period of days, the blood levels of all the sunscreen chemicals they tested exceeded the FDA threshold that could potentially waive further safety testing. Then in 2020, they found that just a single application of all the chemical sunscreens they tested surpassed the threshold. Now, just because they're absorbed into our system doesn't necessarily mean they're unsafe, it just means they need to be tested for safety, which the FDA determined the multi-billion dollar sunscreen industry has so far failed to do.

The FDA concluded that two ingredients can be considered safe, zinc oxide and titanium dioxide. And two can be considered unsafe, PABA and trolamine salicylate. And the other 12 ingredients that are currently marketed have yet to be sufficiently safety tested.

According to a review of more than 700 sunscreen brands, it appears PABA and trolamine are no longer being marketed in sunscreen sold in the United States, uh but they still may be available in other countries.

Until the data are in on the rest of the chemical sunscreens, I would recommend sticking to the two mineral sunscreens.

Sunscreen Use and Skin Cancer in Darker Skin

Historically, they've tended to be thicker and whiter, which could lead to even more severe underdosing, but newer micronized formulations with smaller mineral particle sizes tend to be less noticeable. This is particularly an issue for those with darker skin. Uh the average built-in SPF of black skin, also known in the medical literature as {quote} ethnic skin or SOC, skin of color, is about 13 naturally, compared with only about three for white skin. Though there haven't been any interventional studies on sunscreen effectiveness for skin cancer prevention in people [clears throat] with dark skin, an SPF of 13 is not considered sufficient sun protection. So, the American Academy of Dermatology recommends regular sunscreen use with an SPF of 30 or higher for people of all skin types.

Unfortunately, only about 12% of non-Hispanic blacks and 31% of Hispanics report regularly using sunscreen, compared about 44% of non-Hispanic whites. Uh despite this, the incidence of melanoma, the deadliest skin cancer, is five times lower in Hispanics compared to whites and more than 25 times lower among blacks. However, the mortality rate, if you do get it, is higher among African Americans, presumed to be due from delayed diagnosis.

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