About 90 percent of all skin cancers are associated with exposure to the sun’s harmful UV radiation, and sunscreen is one of the key strategies that helps prevent excessive exposure. When used as directed (applying one ounce to the entire body 30 minutes prior to going outside, and reapplying every two hours outdoors or immediately after swimming or sweating heavily), it can reduce the risk of actinic keratosis, the most common skin precancer, and squamous cell carcinoma, the second most common skin cancer, which affects an estimated 700,000 people in the US annually.

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In fact, recent research shows more convincingly than ever that sunscreen protects against melanoma. This past December, a groundbreaking study of 1,621 Australians found that regular sunscreen users reduced their incidence of melanoma by 50-73 percent. Earlier “retrospective” studies of sunscreen use, relying on people’s memories, pointed to a protective benefit, but this landmark “prospective, randomized” trial in humans is the first to show a significant and definitive benefit.
SUNSCREEN AND VITAMIN D DEFICIENCY

Similarly, assertions that sunscreen use induces vitamin D deficiency, leaving us vulnerable to cancers and other medical problems, are unproven. Vitamin D is essential for strong bones and a healthy immune system, but a recent review of 1,000 studies by the Institute of Medicine (IOM) in Washington, DC, determined that the vast majority of Americans take in enough vitamin D, and found no sound evidence that vitamin D insufficiency is currently leading to cancers, heart disease, diabetes, or other conditions.8

Because the human body produces some vitamin D in response to the sun’s UV radiation, sunscreen use could in theory reduce vitamin D levels. However, several studies have found that subjects’ regular sunscreen use did not prevent adequate vitamin D intake.9,10 It is also important to note that our bodies can manufacture only a certain amount of vitamin D from the sun. After reaching this limit within minutes, further UV exposure has a reverse effect, breaking down vitamin D into inactive compounds.11,12,13,14

The health risks of UV exposure — including skin cancer and premature skin aging — are great, and except for bone loss, far better proven than the suggested dangers of vitamin D insufficiency. The Skin Cancer Foundation advises children and adults under age 70 to obtain the IOM’s recommended daily 600 IU (international units) of vitamin D a day from foods such as oily fish, fortified dairy products and cereals, and supplements. Four hundred IU of vitamin D is an appropriate dose for infants under 12 months old, and 800 are recommended for people 70 and older.15

OXYBENZONE

A synthetic estrogen, oxybenzone is a chemical filter present in US sunscreens since the early 1980s. Some studies have demonstrated that it can penetrate the skin, interfering with hormone levels.16 However, a 2004 study found that oxybenzone did not cause significant hormone disruption in humans.17

Much of the concern stemmed from a 2001 study which found that 21-day-old rats fed 1,500+ mg of oxybenzone per kilogram a day — an astronomically high dose — had a 23 percent increase in uterine weight.18,19 But what holds true in rat studies often does not end up applying to humans. Indeed, no evidence has shown that oxybenzone has any adverse health effect in humans.

Though oxybenzone is absorbed by the body, it does not accumulate — it is excreted, making significant buildup virtually impossible. The ingredient
is FDA-approved for human use based on exhaustive review. The Skin Cancer Foundation’s Photobiology Committee reviewed the studies as well, finding no basis for concern about the use of sunscreens containing oxybenzone.

**RETINYL PALMITATE**

Retinyl palmitate, a common sunscreen ingredient in trace amounts, is the form of vitamin A stored by the skin. Vitamin A is an essential nutrient, and the National Institutes of Health’s Office of Dietary Supplements recommends that adults obtain 3,000 to 4,300 International Units (IU) a day.20

Several studies suggest that when exposed to UV radiation, retinyl palmitate generates free radicals,21,22 chemically reactive substances whose interactions with DNA may cause mutations leading to cancer. However, these studies have examined retinyl palmitate only as it reacts to UV radiation in isolation. In practice, when a sunscreen with retinyl palmitate is applied to the skin, antioxidants like vitamins C and E present in the body can neutralize free radicals.23

**NANOPARTICLES**

Titanium dioxide and zinc oxide are physical sunscreens with a long history of use, and considered two of the most protective broad-spectrum ingredients. They are comprised of large particles which, in traditional sunscreen formulations, showed up on the skin as a thick, white paste. By minimizing, or “micronizing,” the size of sunscreen particles, the ingredients’ characteristic opacity is reduced, giving the skin a much more natural appearance. As nanoparticles (a nanometer is one billionth of a meter; nanoparticles are from 1 to 100 nanometers), zinc oxide and titanium dioxide offer the ingredients’ sun protection abilities with a more appealing cosmetic appearance.

The concern is that nanoparticles can be absorbed by the skin and harm living skin tissue. However, current research indicates that fears about absorption are unwarranted: Sunscreen is applied to the stratum corneum, the outermost layer of skin, which is made up of dead cells, and multiple studies have shown that nanoparticles do not penetrate living skin.27,28,29,30,31,32 Additionally, in sunscreen formulas, it appears that nanoparticles tend to clump together to form larger-than-nano-sized particles.

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As over-the-counter (OTC) drugs, sunscreen ingredients must be approved by the US Food and Drug Administration (FDA) prior to release for sale in the US. Currently 17 sunscreen ingredients are approved, including oxybenzone, titanium dioxide, and zinc oxide. In addition, several ingredients are under FDA consideration: Tinosorb®M (bisoctrizole); Tinosorb®S (bemotrizinol); octyl triazome; amiloxate; enzacamene, and isorotinal.

He directs training courses in photomedicine and has been an invited speaker at many national and international meetings in his specialty.

**References available on p.97.**

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9. Ibid.


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3. [In press] [Please contact Dr. Ashley at Info@SunSafetyForKids.org to find out when the manual will be published.]
4. CSBA Sample Board Policy, Students, Sun Safety; Board Policy 5141.7 [2006] www.csba.org.

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