How to Build a Better Sunscreen

Accessibility and personalization are key factors to building a better sunscreen.

BY HEIDI SPLETE

Summer is just around the corner, and with it comes the seasonal revisiting with patients about the importance of sunscreen and their concerns regarding sunscreen safety. Helping patients not only navigate the available sunscreen options but also using them effectively can be a challenge.

One of the keys to successful sunscreen use is creating a habit, according to Steven Q. Wang, MD, medical director of Dermatologic Oncology at the Hoag Family Cancer Institute, Newport Beach, CA. "Most people know that using sunscreen is important, but they forget," he told Practical Dermatology.

Creating a habit takes time, but it can be done. One study conducted by Dr. Wang and colleagues showed that individuals’ sunscreen use increased by 26% simply by placing sunscreen next to their toothpaste as a reminder.\(^1\)

However, the sunscreen product itself can be a barrier to use, noted Dr. Wang. Many patients encounter misinformation about chemicals from sunscreens being absorbed into the bloodstream, he said.

Sunscreen technology continues to evolve, and recent research suggests that additional safe and effective products are on the horizon.

NOT NEW, BUT NOT (YET) APPROVED

In a study published in Regulatory Toxicology and Pharmacology,\(^2\) Carl D. D’Rui, MPH, of DSM Nutritional Products, Parsippany, NJ, and colleagues reported on bemotrizinol, an active ingredient under consideration for approval by the US Food and Drug Administration (FDA). Bemotrizinol, which has been used globally since 2000, is a high molecular-weight, highly photostable, ultraviolet (UV) filter that is "more soluble in cosmetic oils to aid in preparing better, efficacious broad-spectrum sunscreens from oil-in-water emulsion formulations," the researchers wrote.

Bemotrizinol is the first new sunscreen active ingredient to be considered for inclusion in the over-the-counter sunscreen monograph in the FDA’s new Generally Recognized as Safe and Effective testing guidelines,\(^3\) noted the DSM investigators. The researchers conducted in vitro percutaneous permeation testing to assess the skin permeability of bemotrizinol in a maximum usage trial. The primary outcome of the trial (which included 14 adults) was whether a 6% concentration of bemotrizinol in a high-penetrating vehicle was absorbed into the system under maximal use conditions. The study authors found no evidence of bemotrizinol accumulation or steady state >0.5ng/mL, the FDA’s threshold of relevance, and adverse events reported in eight participants included seven cases of mild skin irri-
EDUCATE PATIENTS FOR INFORMED DECISIONS

Dermatologists can help their patients make informed choices about sunscreens by providing educational materials and some general guidance, according to Dr. Wang. For example, “You want a sun protection factor (SPF) greater than 30 for daily use, but something with water resistance and an SPF of at least 50 for outdoor exercise,” he said. Dr. Wang also recommends tinted sunscreens for individuals with darker skin types. Tinted products are highly effective in blocking out visible light, which causes the hyperpigmentation that is a greater concern than skin cancer for many patients with darker skin types, he said.

The range of currently available sunscreens in the United States is limited by current FDA regulations, noted Dr. Wang said. “We don’t have the many UV filters in comparison with the rest of the world,” he said. However, the effort to earn FDA approval of bemotrizinol is an exciting development in building better sunscreens, according to Dr. Wang, who has worked with some of the researchers at DSM Nutritional Products. The company is in discussion with the FDA to finalize additional studies, he added.

Bemotrizinol is not absorbed into the bloodstream, which is positive news, noted Dr. Wang. “The hope is that bemotrizinol will be approved sometime in 2024 and will be added to the arsenal of filters that we have,” he said.

Looking ahead, other key factors to building a better sunscreen include accessibility and personalization, Dr. Wang told Practical Dermatology. Accessibility is partly a cost issue, because many effective sunscreens are expensive, and the current price inflation adds an additional cost burden, he said.

In addition, future sunscreens should be more personalized, Dr. Wang commented. Many people still think of sunscreen only to prevent sunburn, but targeted products that would optimize sun protection benefits for different skin types are needed, he said.

NEW STUDIES EXPLORE NATURAL ALTERNATIVES

Both organic and inorganic sunscreen filters have their pros, cons, and limitations, and researchers continue to explore alternatives. A recent study in the journal *Molecules* assessed the properties of onion peel and passion fruit peel as natural alternatives to currently available synthetic antioxidants and UV filters.

“One of the main challenges in sunscreen formulation is the production of photostable cosmetics that maintain an unaltered appearance and function when exposed to UV radiation,” wrote Sara M. Ferreira, PhD, of the University of Porto, Portugal, and colleagues. Previous studies have shown that the metabolites produced by plants have antioxidant, antibacterial, and anti-inflammatory properties and the capacity to absorb UV radiation, which suggests potential as organic UV filters, according to the researchers. In particular, phenolic compounds act as protection against UV light, and onion peels and passion fruit peels are rich sources of these compounds.

In the study, the researchers compared SPF for onion peel extract, passion fruit extract, and oxybenzone at concentrations of 0.2mg/mL, 0.2mg/mL, and 0.01mg/mL, respectively.

Overall, onion peel had the highest SPF value (8.8), compared with 3.3 for passion fruit peel and oxybenzone. “However, the concentration of oxybenzone was 20 times lower than the one used for the extracts to obtain an absorbance spectrum between 0 and 1,” the researchers noted.

The study findings show the potential of phenolic extracts to absorb UV radiation, which makes them interesting for applications in the cosmetic industry, according to the researchers. However, more research is needed to study the potential adverse effects of onion peel and passion fruit peel, with evaluations of the toxicity and photostability of these extracts, the investigators concluded.

MEET PATIENTS WHERE THEY ARE, OFFER OPTIONS

The persistent sunscreen challenges that Adam Friedman, MD, faces with his patients are generally in three categories: adherence to a routine, satisfaction with the vehicle, and concerns about safety.

Proper use of sunscreen requires “a burdensome but proactive regimen,” said Dr. Friedman, professor and chair of dermatology and director of translational research at George Washington University, Washington, DC.

Sunscreen must be used consistently and reapplied as needed, and it is important to remind patients (especially those who are resistant to sunscreen use) to practice other sun protection behaviors such as wearing protective clothing and seeking shade, he said.

As all dermatologists know, the vehicle matters, and sunscreen is no exception. The current mineral/physical filters,
zinc oxide and titanium dioxide, have improved in opacity, but some types still leave a residue, and both filters need to be suspended in a greasy vehicle that can be unappealing when at the macro scale, according to Dr. Friedman. “Nanoparticulate formulations (ultrafine, microfine) can overcome these challenges and have been deemed safe through extensive research,” he said.

The third factor, which future sunscreens must address, is safety. “Many safety concerns about chemical sunscreens are not supported by evidence,” but are spread by word of mouth and social media, Dr. Friedman emphasized. However, dermatologists need to take patients’ concerns into account, he said. “You can argue until you are blue in the face that there is no evidence of cancer or endocrine disruption, but our job is not to convince or debate, but to identify how to protect our patients,” he added.

As for new sunscreen products in the pipeline, Dr. Friedman expressed enthusiasm for bemotrizinol’s entry into the FDA approval process. “To me, it highlights the evolving approach to assessing sunscreens and getting them approved,” he said. However, part of the challenge of approving new sunscreen products is setting standards for evaluating the safety of a product that will be applied in many different formulations, he noted. The study by D’Ruiz and colleagues not only shows the safety of bemotrizinol, but it also demonstrates that the company is following the rules for what the FDA expects, he said.

However, the best sunscreen product is the one that patients will actually use, regardless of price, vehicle, or specific SPF, Dr. Friedman said.

Dr. Wang and Dr. Friedman had no relevant financial conflicts to disclose. Dr Ferreira and colleagues had no financial conflicts to disclose.