SKIN

OPINION PIECE

Editorial: Overcoming Consumer Challenges in Sunscreen Selection

Alex M. Glazer MD[a], Ryan M. Svoboda MD MS[b], Rebeca W. Teplitz BA[c], Darrell S. Rigel MD MS[d]

[a]Division of Dermatology, University of Arizona School of Medicine, Tucson, AZ
[b]National Society for Cutaneous Medicine, New York, NY
[c]New York Institute of Technology, College of Osteopathic Medicine, Old Westbury, NY
[d]Ronald O. Perelman Department of Dermatology, NYU School of Medicine, New York, NY

The advent of the Internet has forever changed the face of medicine. In the modern "Age of Google" patient decisions are increasingly influenced by online blogs, reviews, and recommendations that include an element of subjective opinion and may not be fully based on strict scientific evidence alone. Physicians who are not attuned to this will increasingly struggle when trying to provide guidance to their patients, who often have pre-conceived notions based on non-peer reviewed information they receive on the Internet.

One area particularly impacted by online advice is sunscreen selection. Major consumer knowledge gaps in this space accentuate this issue. For example, consumer comprehension of newly FDA-mandated sunscreen labeling information is subpar, with only around 10% understanding the concepts of SPF, broad-spectrum, and water-resistance.[1] These knowledge gaps provide an impetus for consumers to turn to external advice when choosing between sunscreen products that at first glance appear comparable. Many consumers use online information to fill in these gaps—information which is often not peer-reviewed or based in rigorous science.

Lay sunscreen ratings frequently employ non-transparent research methods that may potentially be influenced by conflicts-of-interest and political agendas. This problem is illustrated by the Environmental Working Group's (EWG) annual sunscreen guide.[2] To our knowledge, the EWG's scientific team does not include a dermatologist or photobiologist and their data appears to be largely based on hypothetical models without *in vivo* testing. In our opinion, their ranking system is inherently biased—focusing only half of their formula on direct sunburn prevention measures, with the rest related to potential "health hazard risks" based on unrelated science leveraged to support their views. Problems related to this evaluation process have led to sunscreens historically rated highly by the EWG having significant failures leading to class-action lawsuits for non-performance.[3]

As an additional example of the concerning nature of the EWG's ranking system, the rating scale significantly penalizes sunscreens that contain oxybenzone due to reported carcinogenic risks with *oral ingestion* in animal models. However, millions of users use oxybenzone-containing sunscreen products every summer weekend, and none of the ill

effects suggested by the EWG have been seen in human populations. In addition, to reach the systemic levels of oxybenzone shown to be potentially harmful in rats, a consumer would need to apply 1 mg/cm^2 of sunscreen (50% of the concentration used for SPF testing) to 25% of the body surface area (BSA) every day for 277 years. Even if sunscreen was applied to 100% of the BSA at a density of 2 mg/cm^2 (which is essentially an impossibility), it would still take approximately 35 years of daily application to approach the amount of oxybenzone that the rats were exposed to in laboratory studies.[4,5]

Furthermore, the EWG penalizes sunscreens with an SPF greater than 50 because "imbued with a false sense of security, people extend their time in the sun well past the point when users of low-SPF products would head indoors." This viewpoint fails to account for studies demonstrating that in real-world application settings, superior protection is achieved with the use of higher-SPF sunscreens.[6] The typical application density in real-world settings is less than half of that mandated during the SPF testing process for new products; as such there are benefits to higher SPF products seen in actual use that do not translate to the laboratory setting.[7] Lastly, although trying to position themselves as an independent auditor, there is a potential direct conflict-of-interest between the EWG and their recommendations as they earn click-through revenue through purchase of recommended products at online stores. Other online sunscreen ratings have similar limitations.[8] Despite this, these problematic statements often get disseminated by other publications without appropriate scrutiny, which in our opinion may be potentially increasing public risk.[9]

With these types of challenges, how can we better ensure that patients are properly equipped to make informed sunscreen selections? First-and-foremost, dermatologists must do more than simply urge their patients to use sunscreen. We must be proactive and ask what our patients know about sunscreen selection, where they get their information, and which products they use. We must be aware of the resources patients are using to guide sunscreen purchases so that education can be imparted and misinformation corrected.

Dermatologists also must keep current with the evolving science of sunscreen evaluation. The FDA has made efforts to make sunscreen labeling more useful to the general consumer, but these have been largely unsuccessful.[1] Part of the problem is that SPF only uses an indirect protection measure (sunburn) that does not relate directly to the carcinogenic properties of ultraviolet radiation. In an attempt to improve this, research targeted at developing efficacy measures more directly related to the cancer-protective mechanisms of sunscreen is underway.[10-13]

Multiple studies have demonstrated that the regular use of sunscreen decreases skin cancer risk.[14-16] Even with a minor improvement in sunscreen use, it has been estimated that 230,000 cases of invasive melanoma could be prevented in the US over the next 15 years.[17] Despite an apparently easy opportunity for primary prevention, an abundance of Internet information may be discouraging people from appropriate sunscreen usage, thereby exposing them to undue risk. By producing a more comprehensible framework that allows product comparison based on efficiency in preventing skin cancer, the potentially negative effect of recommendations from non-peer reviewed sources could be eliminated. In any event, dermatologists must be at the forefront of the effort to abolish the impact of

misleading Internet "science" in order to best protect our patients in this area.

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Corresponding Author:
Alex M. Glazer, MD
Department of Dermatology, University of Arizona
PO Box 245024
1515 N. Campbell Avenue
Tucson, AZ 85724-5024
212-685-3252 (Office)
alexglazer@gmail.com

References:

1. Svoboda RM, Teplitz RW, Farberg AS, Rigel DS. Patient and consumer knowledge of sunscreen labeling terminology: a cross-sectional survey. *Manuscript in preparation.*

2. EWG's Guide to Sunscreens http://www.ewg.org/sunscreen/ accessed June 17, 2017.

3. Kroll D. "The Failure of Jessica Alba's Honest Sunscreen Explained". *Forbes.* August 3 2015. https://www.forbes.com/sites/davidkroll/2015/08/03/the-failure-of-jessica-albas-honest-company-sunscreen-explained/#57c2df8d3483. Accessed June 19 2017.

4. Wang SQ, Burnett ME, Lim HW. Safety of oxybenzone: putting numbers into perspective. *Arch Dermatol.* 2011;147(7):865-866.

5. Wang SQ, Douza SW, Lim HW. Safety of retinyl palmitate in sunscreens: a critical analysis. *J Am Acad Dermatol.* 2011;63(5):903-906.

6. Williams JD, Maitra P, Atillasoy E, Wu MM, Farberg AS, Rigel DS. SPF 100+ sunscreen is more protective against sunburn than SPF 50+ in actual-use: Results of a randomized, double-blind, split-face, natural sunlight exposure, clinical trial. *J Am Acad Dermatol.* 2017.

7. Ou-Yang H, Stanfield J, Cole C, Appa Y, Rigel D. High-SPF sunscreens (SPF >/= 70) may provide ultraviolet protection above minimal recommended levels by adequately compensating for lower sunscreen user application amounts. *J Am Acad Dermatol.* 2012;67(6):1220-1227.

8. Consumer Reports Sunscreen Buying Guide http://www.consumerreports.org/cro/sunscreens/buying-guide.htm accessed June 17, 2017.

9. Why some people worry that sunscreen might be bad for you Popular Science http://www.popsci.com/sunscreen-harmful accessed June 14, 2017.

10. Cole C, Appa Y, Ou-Yang H. A broad spectrum high-SPF photostable sunscreen with high UVA-PF can protect against cellular damage at high UV exposure doses. *Photodermatol Photoimmunol Photomed.* 2014;30(4):212-219.

11. Liebel F, Kaur S, Ruvolo E, et al. Irradiation of skin with visible light induces reactive oxygen species and matrix-degrading enzymes. *J Invest Dermatol.* 2012;132(7):1901-1907.

12. Seité S, Moyal D, Verdier MP, et al. Accumulated p53 protein and UVA protection level of sunscreens. *Photodermatol Photoimmunol Photomed.* 2000;16(1):3-9.

13. Mancuso JB, Maruthi R, Wang SQ, et al. Sunscreens: an update. *Am J Clin Dermatol.* 2017; May 16. doi: 10.1007/s40257-017-0290-0. [Epub ahead of print]

14. Green AC, Williams GM, Logan V, et al. Reduced melanoma after regular sunscreen use: randomized trial follow-up. *J Clin Oncol.* 2011;29(3):257-263.

15. Olsen CM, Wilson LF, Green AC, et al. Cancers in Australia attributable to exposure to solar ultraviolet radiation and prevented by regular sunscreen use. *Aust N Z J Public Health.* 2015;39(4):471-476.

16. Ghiasvand R, Weiderpass E, Green AC, et al. Sunscreen use and subsequent melanoma risk: a population-based cohort study. *J Clin Oncol.* 2016; Sep 12. Doi: 10.1200/JCO.2016.67.5934 [Epub ahead of print]

17. Olsen CM, Wilson LF, Green AC, Biswas N, Loyalka J, Whiteman DC. How many melanomas might be prevented if more people applied sunscreen regularly? *British J Dermatol.* 2018;178(1):140-147.