Division of Dockets Management (HFA-305)
U.S. Food and Drug Administration
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Additional comments on "Sunscreen Drug Products for Over-the-Counter Human Use"
Docket No. FDA-1978-N-0018

Environmental Working Group, along with five other organizations, submitted comments to the Food and Drug Administration on June 27, 2019, supporting the agency's effort to ensure that sunscreens are safe and effective. In addition to those comments, EWG submits the following technical comments that address many of the specific questions for which the agency requested feedback:

1) Response to FDA proposal to finalize the sunscreen monograph.

EWG supports the FDA effort to finalize the sunscreen monograph. We agree with the proposed active ingredient classifications and in general support FDA efforts to make sure sunscreens are effective and safe for use. In particular, the Maximal Usage *Trial* (*MUsT*) studies and associated toxicity tests are necessary to protect public health and ensure that the use of sunscreen outweigh potential risk. The recently published study by FDA scientists showing absorbance of four different sunscreen chemicals highlights the need for a comprehensive evaluation of how these chemicals may affect health over a lifetime (Matta 2019). In response to these new findings, EWG submitted a petition to the Centers for Disease Control and Prevention to add common sunscreen chemicals to the CDC's Biomonitoring Program (EWG 2019). In addition to our specific comments below, EWG supports the proposal to classify combined sunscreen and insect repellents as not generally recognized as safe an effective.

2) FDA question: Is the proposed cap on labeled SPF (60+) and formulated SPF (80) appropriate?

No. EWG does not support FDA's proposals to allow products with labeled SPF up to 60+ and formulated SPF up to 80. The FDA should establish an SPF cap, whether labeled or for formulation, at 50+ for all products.

To justify increasing the SPF limit from 50+ to 60+, the FDA cited three health studies (FDA 2019), each of which investigated the benefits of sunscreen use by comparing a group of subjects using no sunscreen against a group using a product with a high SPF. None of the studies included a comparison group using a lower SPF sunscreen (Ulrich 2009, Kuhn 2011, Faurschou 2008). All three publications showed a clinical benefit to sunscreen use but failed to show a clinical benefit of using an SPF 60 product compared to a product with SPF 50 or lower. In addition, all three studies investigated formulations that could not be legally sold in the U.S. because they used active ingredients not included in the FDA monograph.

EWG agrees with the agency that high SPF products may promote extended time in the sun and provide users with a false sense of security (Autier 2007, EWG 2009, EWG 2011, EWG 2016). EWG is also concerned about the use of high SPF sunscreens because, based on the current methodology for measuring SPF, the results are not reproducible from one laboratory to another. In addition, a change in light transmission of less than 2 percent can make the difference between an SPF 37 and an SPF 100 (EWG 2016, P&G 2009).

In 2016, EWG submitted a letter to FDA requesting that the agency investigate the difference between in vitro measured protection and in vivo labeled SPF for sunscreen products. (EWG 2016). In particular, we asked the agency to evaluate whether anti-inflammatories or antioxidant ingredients were responsible for the high SPF products seen on the market. The differences between the in vivo and in vitro measured SPF and corresponding UVA protection are especially significant in high SPF products. In data submitted within comments to the agency in 2009, the in vitro measured SPF was less than half of the labeled SPF for 86 percent (12/14) of sunscreens with an SPF of 70 and higher (See Table 1.).

Label SPF	In vitro measured SPF	Critical Wavelength	Critical Wavelength (pass = ✓)	UVA I/UV (pass = ✓)
70	21.0	379	✓	✓
70	16.0	380	✓	✓
70	9.7	381	✓	✓
70	10.3	381	✓	✓
71	19.3	377	✓	✓
71	20.0	378	✓	✓

71	14.0	379	✓	✓
71	10.7	379	✓	✓
80	35.0	377	✓	✓
80	36.0	378	✓	✓
85	52.0	378	✓	✓
91	32.7	378	✓	✓
96	75.0	377	✓	✓
101	23.0	381	✓	✓

Table 1. Data from public comments submitted to FDA (P&G 2009).

On average, the in vitro measured SPF was just 34 percent of the label SPF for the 14 products tested with an SPF of 70 or greater (P&G 2009), and yet every single one would be expected to pass the FDA proposed UVA test. For the 66 products tested with an SPF between 15 and 45 inclusive, the in vitro SPF was on average 65 percent of the label SPF but only 71 percent of these products would be expected to pass the UVA1/UV test. The lack of concordance between the in vivo and in vitro measurements raises significant concerns that sunscreen products, particularly those with high SPF values, may be vastly underprotecting from UVA radiation.

The FDA's proposal to allow formulations up to SPF 80, though capping the labeled SPF at 60+, is ripe for consumer confusion and will only result in products that provide poorer UVA protection. The increase in products with exceedingly high SPF values is being driven by research indicating that American consumers are driven to purchase products with the highest number (Kong 2015, Shuai 2016). The marketing and sales departments of some sunscreen companies continue to push products with ever higher SPF values, taking advantage of the fact that the average American consumer is generally not aware of the downside of using these high SPF products. As a result, by allowing a higher SPF for marketing purposes, the FDA might help some companies sell more products but, ultimately, this would be harmful to the consumer.

Allowing companies to formulate to higher SPFs runs counter to the FDA's stated goals to promote the development of products with greater UVA protection. The agency can ensure that U.S. products provide greater UVA protection only when sunscreen companies turn their attention away from gaming the SPF test in order to sell products with the highest number and instead focus their research and development efforts on providing greater UVA protection. The agency should also

refer to section 4 of our comments and add additional active ingredients to the sunscreen monograph.

3) FDA question: Does the proposed UVA standard adequately substantiate broad spectrum protection?

No. The changes FDA proposed to UVA protection assessments are not adequate for consumer protection. To strengthen the UVA protection offered by sunscreen products, the FDA should: (1) use an evaluation method that ensures the UVA protection increases as the labeled SPF increases; (2) cap the SPF at 50+, and (3) approve additional active ingredients in the monograph that can provide increased protection. In this section we will expand upon (1) and leave our comments on (2) and (3) to other response sections within these comments.

The FDA's proposed addition to the current broad-spectrum test requirements, requiring a critical wavelength of 370nm and a UVA I/UV ratio of 0.7, will require sunscreens, measured in a controlled environment, to have greater uniformity with respect to reducing UVA radiation in comparison with UVB radiation. The proposed methodology does not ensure that the UVA protection increases with increasing SPF. Using the BASF Sunscreen Simulator or our in-house sunscreen simulator, EWG found that many products currently on the market that advertise an SPF of 100 or greater would pass the proposed UVA standard (EWG 2019, BASF 2019, Herzog 2015). Europe has addressed this issue by requiring the in vitro UVA protection factor to be within one-third of the in vivo labeled SPF, as outlined in the ISO 24443:2012 standard (Cosmetics Europe 2011, ISO 2012). In lieu of adopting that standard, the FDA could also require companies to label products with the lowest SPF value measured in vivo or in vitro, tested using a control standard and using a c-factor adjustment of 0.8-1.2 as outlined in the Colipa 2011 guidelines (Colipa 2011, EWG 2016).

EWG agrees with the FDA that protection from UVA light is important, especially given the increasing body of scientific evidence that UVA light may play an important role in the development of melanoma. Tanning beds that emit primarily UVA light were classified by the World Health Organization in 2012 as a known human carcinogen (IARC 2012). Modeling completed by researchers from BASF shows that significant time spent in the sun using a sunscreen with poor UVA protection is equivalent to a session at a tanning salon. This is highly problematic, yet the concern in the scientific community that UVA radiation and sunscreens lacking UVA filters may play a role in the increased rates of melanoma reaches back decades. In 1993, researchers wrote about their concerns with sunscreens that lack

UVA protection and the potential to increase cancer rates. The authors were careful to point out the complexity of the issue and how many factors may influence cancer rates, yet they write that "If melanomas are initiated or promoted by solar radiation other than UVB, as laboratory data suggest (49,50) then UVB sunscreens might not be effective in preventing these cancers, and sunscreen use might increase the risk of their occurrence" (Garland et al 1993).

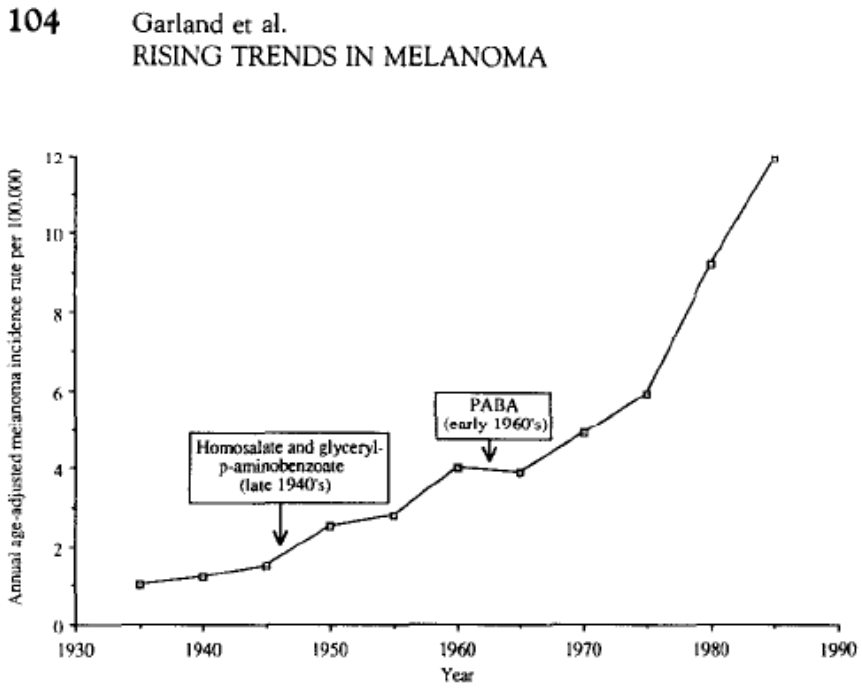

FIGURE 1. Age-adjusted annual incidence rates of melanoma and dates of introduction of suntan lotions containing sunscreens, 1935 to 1985 (3, 34; J. T. Flannery, Connecticut Tumor Registry. Personal communication, 1991). PABA = para-aminobenzoic acid.

Figure 1. Increasing rates of melanoma observed in the early 90's (Garland 1993).

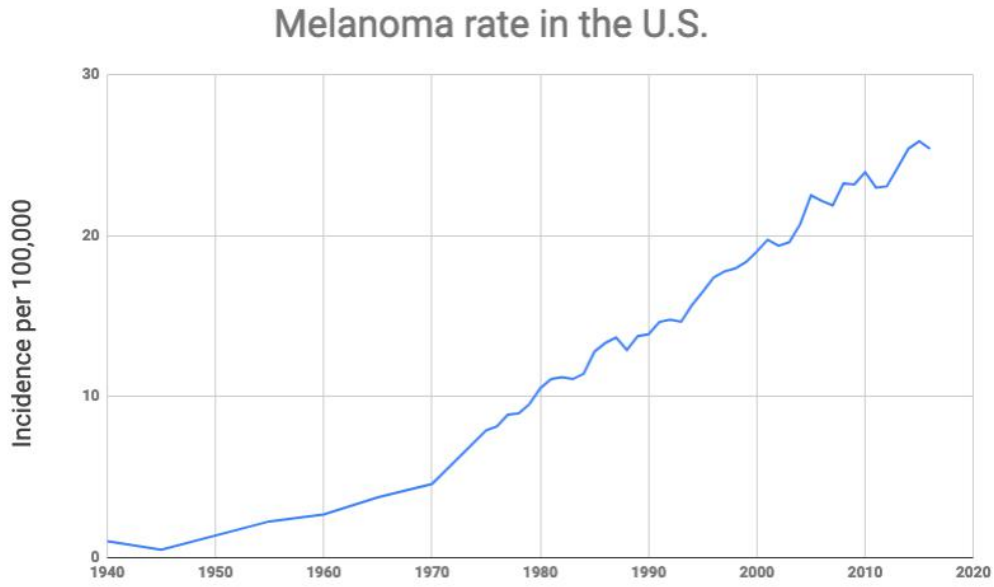

Figure 2. Since 1993, the incidence rate for melanoma has doubled in the U.S. (NCI 2019, Godar 2011).

In its draft monograph, FDA states, "we are concerned about the existing potential for inadequate UVA protection in marketed sunscreen products. This is a particular concern with respect to high SPF sunscreens products…." (FDA 2019). EWG agrees with the agency about the lack of UVA protection in sunscreen products being a public health concern, but the proposed changes do not adequately address many of the high SPF and low UVA protection products the agency has flagged as most concerning.

The FDA proposed rule takes many steps to ensure that consumers are using safer, more effective sunscreen, potentially with improved protection against UVA radiation, but does not go far enough fast enough to address the lack of balanced UVA protection in sunscreen products.

4) With regards to sunscreen active ingredients on the monograph and available for use by formulators, we propose that, absent greater concerns than those raised about oxybenzone, the FDA should take two simultaneous actions to provide consumers with more effective and safer sunscreens.

    (1) The FDA should add bemotrizinol (Tinosorb S), bisoctrizole (Tinosorb M), ecamsule (Mexoryl SX), drometrizole trisiloxane (Mexoryl XL) to the sunscreen monograph and, simultaneously,

(2) the FDA should classify bemotrizinol (Tinosorb S), bisoctrizole (Tinosorb M), ecamsule (Mexoryl SX), drometrizole trisiloxane (Mexoryl XL) as GRASE III, additional data needed, based on the Over-the-Counter Sunscreen Feedback Letters.

These four pending applications are unique in providing UVA filter options for sunscreen manufacturers. With respect to providing protection from UVA light, formulators are limited to the use of zinc oxide up to 25 percent or avobenzone up to 3 percent. Likewise, the FDA should consider allowing the increased use of avobenzone up to 5 percent, absent specific toxicity concerns. With respect to the other pending OTC applications for amiloxate, enzacamene, diethylhexyl butamido triazone, octyl triazone, the FDA could consider the similar action of adding to the monograph and classifying as GRASE III, although the immediate need for different UVB filters is less apparent from an efficacy and health protection perspective.

5) Response to FDA requests specific to the use of oxybenzone.

Judging from the current evidence, it is unlikely that oxybenzone could be considered GRASE. If there is sufficient toxicity information generated to establish oxybenzone as GRASE, EWG agrees that sunscreen manufacturers who want to use oxybenzone should provide data that supports the safe use of this ingredient in children under age two. In particular, oxybenzone is expected to absorb through children's skin at a higher rate than in adults, and children are especially vulnerable to exposure to endocrine-disrupting chemicals (Scinicariello 2016). In the event that manufacturers or users of oxybenzone are unable to substantiate the safe use in children under age two, these products should carry a warning that they should not be used on young children.

6) FDA Question: Should SPF values below 15 remain in the market?

Products with SPF values less than 15 that do not pass the revised broad-spectrum test should not be allowed on the market. For historical context, the 1978 Advanced Notice of Proposed Rulemaking classified SPF 8 or higher as maximal or ultra (FDA 1978). For people who rarely burn, an SPF 2 product was recommended. These values are in line with the protection users likely need and with the measured protection factor of 10 for a white cotton shirt (Geis 2012). The SPF values sunscreen manufacturers produce continues to increase, though it is not clear that broad-spectrum protection has kept pace. The SPF numbering may be more of an issue, with the measurement methodology, and sunscreen companies gaming the system to advertise higher numbers, in which case removing SPF values under 15 would limit FDA capacity to address these issues. Americans would be better served

with a product with SPF 10 or 20 that adequately protects than with a product with SPF 150 that behaves like a 5 or 10.

7) Response to FDA request for comments on the use of nanomaterials in OTC sunscreen products.

The agency should specify that only rutile titanium dioxide sunscreens be allowed on the market. The free-radical generation, and skin damage potential, of titanium dioxide is strongly determined by the crystal phase of the chemical, with the anatase being much more photoreactive than the rutile phase (Barker 2008). When Friends of the Earth, Australia tested eight products, they found that six included the more photoreactive anatase titanium dioxide (FOE 2015).

Given the rapidly evolving science on nanoparticle impacts on human and environmental health, and the limited results on the absorption of nanoparticles in sunscreens through damaged skin, the FDA should commit to re-evaluating its current safe-as-used determination.

8) Response to FDA request for comments on the use of spray and powder sunscreen products.

EWG supports the FDA proposal to require that all spray and powder sunscreen undergo particle-size analysis to ensure that the particles cannot be inhaled and cause damage. The FDA proposal would require that at least 90 percent of the particles dispensed from a spray product be 10 micron or larger and that "the minimum particle size dispensed from the consumer container must be no less than 5 μm" (FDA, 2019). FDA stated that in its tests, published in 2018, three of 14 sunscreens would not be sellable due to particle sizes smaller than 5 μm. FDA should that the protective limit of 0.1 percent particles be under 5 μm. From the FDA tests, this would limit the number of products that meet the criteria to five of 14 (Liu 2018).

Table 2
Percentage of Small Particle Population of 32 Products and 1 Reference Active Ingredient

Product	%D ≤ 5μm (%)	%D ≤ 10μm (%)
Aerosol product 1	2.38 ± 2.17	8.11 ± 2.76
Aerosol product 2	2.00 ± 0.16	3.81 ± 0.36
Aerosol product 3	0.00 ± 0.00	0.03 ± 0.06
Aerosol product 4	2.77 ± 0.16	5.56 ± 0.38
Aerosol product 5	0.61 ± 0.81	0.23 ± 0.86
Aerosol product 6	0.01 ± 0.02	0.18 ± 0.41
Aerosol product 7	0.02 ± 0.03	0.53 ± 0.35
Aerosol product 8	0.01 ± 0.01	0.38 ± 0.46
Aerosol product 9	0.34 ± 0.71	0.79 ± 1.38
Aerosol product 10	0.45 ± 0.77	0.78 ± 0.91
Aerosol product 11	0.22 ± 0.50	0.36 ± 0.79
Aerosol product 12	0.00 ± 0.00	0.20 ± 0.45
Aerosol product 13	1.75 ± 1.07	3.66 ± 2.42
Aerosol product 14	0.49 ± 0.39	1.07 ± 0.63

Table 2. Particle size of FDA tested products with percent of particles below 5um (Liu 2018).

EWG thanks the FDA for allowing us to comment on the proposed monograph. We support the agency in its efforts to ensure that consumers have safe and effective sunscreens, and we are happy to provide additional feedback.

Sincerely,

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References:

Barker, B. and Branch, A. 2008. The Interaction of Modern Sunscreen Formulations with Surface Coatings. Progress in Organic Coatings, 62(3):313-320.

BASF Sunscreen Simulator 2019. Available at https://www.sunscreensimulator.basf.com/ (accessed June 25, 2019).

Betty Y. Kong et al. 2015. Assessment of Consumer Knowledge of New Sunscreen Labels. JAMA Dermatology 151(9), 1028–1030.

Colipa, 2011. Guidelines: Method for In-Vitro Determination of UVA Protection. March 2011.

Cosmetics Europe, Guidelines: Method for In Vitro Determination of UVA Protection. Brian L Diffey et al., Suntanning with Sunscreens: A Comparison With Sunbed Tanning. Photodermatology, Photoimmunology & Photomedicine, 2015, 31(6), 307–314. 2011.

EWG. 2011. Comments from Environmental Working Group on the U.S. Food and Drug Administration's Draft Guidance on Nanotechnology. 2011, Docket No. FDA-2010-D-0530. Available at static.ewg.org/pdf/EWG-FDA-Comments-Nano-Guidance-August-2011.pdf

EWG 2016. EWG letter to FDA, Urgent need for greater oversight of SPF claims, including manufacturers' testing methodology and use of inactive sunscreen ingredients. Available at: https://cdn.ewg.org/sites/default/files/u381/EWG_Letter_FDA_Sunscreen_August_2016.pdf

EWG 2019. EWG Petitions CDC To Conduct Biomonitoring Studies for Common Sunscreen Chemicals.
Available at: https://www.ewg.org/testimony-official-correspondence/ewg-petitions-cdc-conduct-biomonitoring-studies-common-sunscreen

Faurschou, A. and Wulf, H.C. 2008. "Synergistic Effect of Broad-Spectrum Sunscreens and Antihistamines in the Control of Idiopathic Solar Urticaria," Archives of Dermatology, vol. 144(6), pp. 765-769.

FDA 1978. Advance Notice of Proposed Rulemaking. 43FR38206.

FDA. 2019. Propose rule: Sunscreen Drug Products for Over-the-Counter Human Use. 84FR6204.

Geis P, Mclennan A. 2012. Ready to Wear Sun Protection Clothing Fits the Bill. Skin Cancer Foundation Journal Vol. 102. pp70-72. 2012.

Godar, D, 2011. Worldwide Increasing Incidences of Cutaneous Malignant Melanoma. Journal of Skin Cancer, 2011. DOI: 10.1155/2011/858425

Herzog, B. et al. 2015. Simulation of Sunscreen Performance. Pure and Applied Chemistry, 87(9-10), 937–951.

IARC 2012. IARC monographs, Radiation. Volume 100 D.

ISO 2012. 24443:2012 Determination of sunscreen UVA photoprotection in vitro

Kuhn, A. et al. 2011. Photoprotective Effects of a Broad-Spectrum Sunscreen in Ultraviolet-Induced Cutaneous Lupus Erythematosus: a Randomized, Vehicle-Controlled, Double-Blind Study. Journal of the American Academy of Dermatology, vol. 64(1), pp. 37-48.

Liu X. et al. 2018. Particle Size Distribution Analysis of OTC Aerosol or Powder Drug Products with Potential for Inadvertent Inhalation Exposure to Consumers. J Pharm Sci. 108(4):1506-1511.

Matta M.K. et al. 2019. Effect of Sunscreen Application Under Maximal Use Conditions on Plasma Concentration of Sunscreen Active Ingredients A Randomized Clinical Trial. JAMA. doi:10.1001/jama.2019.5586.

NCI, SEER Cancer Stat Facts: Melanoma of the Skin. 2019. Available at seer.cancer.gov/statfacts/html/melan.html

P&G (The Procter & Gamble Company) 2011. Comments on the Revised Effectiveness Determination; Sunscreen Drug Products for Over-the-Counter Human Use. [Docket No. FDA-1978-N-0018, RIN 0910-AF43].

Scinicariello F. and Buser MC. 2016. Serum Testosterone Concentrations and Urinary Bisphenol A, Benzophenone-3, Triclosan, and Paraben Levels in Male and Female Children and Adolescents: NHANES 2011–2012. Environmental Health Perspectives,:1898-1904; Available at dx.doi. org/10.1289/EHP150

Shuai, X. et al. 2016. Sunscreen Product Performance and Other Determinants of Consumer Preferences. JAMA Dermatol. 2016;152(8):920-927. doi:10.1001/jamadermatol.2016.2344

Ulrich, C. et al. 2009. Prevention of Non-Melanoma Skin Cancer in Organ Transplant Patients by Regular Use of a Sunscreen: a 24 Months, Prospective, Case-Control Study. The British Journal of Dermatology, vol. 161 Suppl 3, pp. 78-84.