Author's response to reviews

Title: Photostability of commercial sunscreens upon sun exposure and irradiation by ultraviolet lamps

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Version: 7 Date: 23 January 2007

Author's response to reviews: see over
23 January 2007

Dear Dr Scott Edmunds,

Thank you for considering our article for publication in BMC Dermatology.

We hereby resubmit the enclosed article "Photostability of commercial sunscreens upon sun exposure and irradiation by ultraviolet lamps".
We have included a Competing interests section and a Authors' contribution section in the manuscript.

Below is a point-by-point response to the reviewer’s comments.

Yours sincerely,

Helena Gonzalez, MD, PhD
Reviewer's report
Title: Photostability of commercial sunscreens upon sun exposure and irradiation by ultraviolet lamps
Version: 6 Date: 25 October 2006
Reviewer: Brian Diffey
Reviewer's report:
General

Major Compulsory Revisions (that the author must respond to before a decision on publication can be reached)

Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)
The authors appear unaware of a paper that is most relevant to their own work and might like to refer to this as it could alter some of their discussion. This is:
We have included this reference in the article.

Discretionary Revisions (which the author can choose to ignore)
What next?: Accept after minor essential revisions
Level of interest: An article of limited interest
Quality of written English: Acceptable
Statistical review: No
Declaration of competing interests: 'I declare that I have no competing interests'

Reviewer's report
Title: Photostability of commercial sunscreens upon sun exposure and irradiation by ultraviolet lamps
Version: 6 Date: 24 November 2006
Reviewer: D Moyal
Reviewer's report:

Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)
Minor essential Revisions

Abstract
Objectives
- The authors use the abbreviation “UVa” for artificial UV exposure. This abbreviation is misleading and could be easily mistaken with UVA.
- The authors should use another abbreviation for artificial UV exposure, for instance “UVart”, in the abstract and everywhere in the text.
We have changed the abbreviations to artificial UV (UVart) and natural UV (UVnat).
Background
- The authors should remove reference 4: results obtained using a fish model cannot be applied to humans.
  This has been done.
- “However, another study shows…” Initiation and promotion are the two steps for developing a cancer.
  Maybe UVB radiation is able to initiate CMM, but this would not mean that it is the most important factor for promoting CMM.
  The authors would better delete this sentence.
  This has been done.
- line 8 “Many manufacturers […] in order to study their photostability.” This paragraph is redundant with the next one line 16. The authors should rewrite the paragraph background.
  We have rewritten this paragraph.

Methods
Light sources
- “This is a broadband radiation source from 280 to 380 nm with the peak at 313 nm”.
  The authors should replace “the” by “a major”, because the spectrum shows several peaks.
  This has been done
- “The intensity of the lamps was measured…”
  The authors should replace by “The irradiance at the exposure plane was measured…”.
  This has been done.
  The radiometer measures an irradiance (units: W.m-2), not an intensity (units: W.sr-1).
  Irradiance and intensity refer to different notions.
  This has been done.
- “[…] and then weighted by the action spectrum of the probe.” The measurement is not a 2 steps process, first measuring the irradiance and then weighting it by the response spectrum of the probe, the authors should delete this part of the sentence.
  This has been done.
- Reference 19: nothing is indicated for this reference in the reference list! The authors should check and correct this.
  This has been done.
- “This corresponds to 45 SED when further weighted by the CIE action spectrum [20].”
  First, the following reference would have been more appropriate: Commission Internationale de l’Éclairage (CIE). Erythema reference action spectrum and standard erythema dose. 1998. Vienna, Austria, CIE Central Bureau. Publ. CIE N° S 007/E; please consider using it.
  We have changed the reference.
  Second, this sentence would mean that the spectral irradiance was measured, since it is the only way to weigh the data by the erythema action spectrum. Now, this is not the case, so this raises the question: How did you get results in SED? This is not explained properly and it has to be explained.
  We did measure the spectral distribution (spectrum below) and weighted it by the CIE action spectrum (ref . The SED was then calculated according to 1 SED is equivalent to an erythemal weighted dose of 100 J/m2. 
- Temperature: the authors may want to add that 50 °C is about 10 °C higher than the temperature of the skin. Furthermore, the stabilization of the temperature was +/- how many °C? Since photodegradation is highly dependent on the temperature of the sample, this point should be specified. We have specified this in the article in the section light sources, paragraph 3.

Spectrometer
- The Cary 4 spectrophotometer does not measure an absorbance, it measures a transmission. Even if the units are Optical Density, which are the same as for absorbance, the spectro does not measure it. The incoming radiation which strikes the sunscreen is absorbed, reflected, scattered or transmitted by the sunscreen. The spectro used here measures a fraction of what is transmitted, a fraction only because of its limited viewing angle. Therefore, the measure without an integrating sphere (which efficiently collects the radiation from every direction) does not take into account the radiation that was scattered but managed to get through the sunscreen. This radiation is important because it can significantly increase the level of signal measured and consequently decrease the level of the spectrum of the sunscreen. A diffuser may be used instead of an integrating sphere, as a class two choice. The absence of an integrating sphere is definitely a problem. The authors should delete the last sentence of the paragraph. This has been done.

Area under the curve
- The area under the curve is calculated as a rough summation. This approximation is not good: for example, the AUC for UVA is not equal to the AUC for UVA1 + the AUC for UVA2, although UVA = UVA1 + UVA2! This is because the value at 340 nm is accounted for twice. The authors should re-do the calculations using the trapezium approximation, which reads for the UVA: $AUC = \sum(\text{value at 321 nm to value at 399 nm}) + \text{half the value at 320 nm and half the value at 400 nm}$. This calculation is easily adapted for AUC for UVA1 and UVA2 and it can be easily checked that now $AUC_{UVA1} + AUC_{UVA2} = AUC_{UVA}$. 

![Graph of intensity vs. wavelength](graph.png)
This is completely right and the sum of the AUC for UVA should equal the AUC for UVA1+AUC for UVA2. We have recalculated the results according to Dr Moyals suggestion. However, the most important factor here is the AUC Index, and that did not change after the recalculation, hence we have not changed the definition of AUC for the different UV regions.

Discussion
- 3rd line: Replace “fluency” by “fluence rate”.
This has been done.
What next?: Accept after minor essential revisions
Level of interest: An article of limited interest
Quality of written English: Acceptable
Statistical review: No