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Recommendations for Reporting Methods in Phototesting Studies

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Letters To The Editor

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Dear Editor,

There are many variations in the way phototesting protocols in clinical research are reported in the photomedicine literature. Specifications regarding the light system, lamp type, irradiance and other components are too often missing or inadequately detailed, making it difficult to fully appreciate the methods used in each study, or compare the findings among different studies (1–5). This letter discusses important parameters that should be included (Table 1) when describing phototesting methodology used in published clinical research, in order to facilitate overall understanding of such studies. This information will also provide essential details from which other researchers may benefit from when trying to reproduce and build upon discussed research.

The components included, such as the light system and lamp type utilized, inherently influence the spectral output, dose, irradiance, rate of treatment duration, fluence and radiation wavelength, all of which are critical in characterizing the irradiance protocol used. Spectral output, detailing the percentages of each waveband comprising the dose, is crucial in distinguishing the specific wavelengths used. The filter used to achieve this output is similarly important. Reporting the distance between the light source and the subject or specimen is also important as some studies measure the dose at the location of the specimen, as often done in vitro studies, while others measure it as the output from a device, as is frequently seen with in vivo studies (3).

Historically, less detail was included. In 1984, the usage of ultraviolet B radiation was sufficiently specific to describe the wavelengths utilized to treat psoriasis (6). However, we are now aware that narrowband ultraviolet B radiation, from 311–313 nm, is more effective than broadband in the treatment of psoriasis (7). Critical in this discovery, but lacking from some publications such as the study referenced earlier by Momtaz-T and Parrish from 1984, are the spectral output specifications of the treatment protocols and the filters used to achieve those wavelengths (6). Presently, a standardized and detailed description of phototesting methodology is key in the advancement of the photomedicine field as it facilitates these discoveries. Cutaneous responses are complex, and major advances can only occur when phototesting protocols are clearly elucidated.

Standardized units are developed by the International Commission on Illumination, the CIE (Commission International de l'Eclairage), and should be utilized whenever possible (8). Further, the validation of a radiation source through spectroradiometry is critical in ensuring results can be appropriately interpreted (9). Validation requires instruments with the appropriate sensitivity and details of the approach utilized to measure the radiation source. Methods must be as complete as possible due to the myriad ways the generation and delivery of such radiation can be affected.

The most straightforward presentation would be to distill all the details into a single table. If multiple treatment regimens are used, this table may be repeated for each instance. Given the innumerable ways to deliver specific doses in photomedicine studies, the communication of this information in the suggested condensed format will facilitate understanding of the utilized irradiation regimen.

Table 1. Recommendations for reporting methods in light-based studies.

Element	Description, Definition, Examples	Information/ Commonly Used Units
Light system	The device used to generate light, including the manufacturer and place of origin	Model, Manufacturer
Lamp or device type	Xenon arc lamp, halogen lamp, LED etc.	
Method of source validation	Spectroradiometry, etc.	
Device geometry	Tubular, etc.	
Fluence/dose	The energy received per unit surface area	J cm^{-2}
Irradiance	Rate at which a dose is delivered or the energy received by a surface per unit area per unit time.	Watts cm^{-2}
Distance between source and sample	The distance between the lamp and the subject or specimen where irradiance measurements were made.	Centimeters
Wavelength range	The complete range of wavelengths comprising the delivered dose	Nanometers
Spectral output specifications	The percentage of distinct wavebands corresponding to predefined cutoffs (i.e., UVA1 340–400 nm within UVA 320-400 nm) within total output	Percentages
Treatment duration	The length of time over which the total dose is delivered	Minutes
Number of treatments	The number of separate occurrences of the regimen	
Filter information	Details of the filter used to deliver the specific wavelengths utilized	Manufacturer, Filter Name
Temperature	Ambient room temperature at which testing is performed	°C

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