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Erythema reference action spectrum and standard erythema dose

Spectre d'action érythémale de référence et dose érythémale normalisée

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by the International Commission on Illumination (CIE) in cooperation with Technical Committee ISO/TC 274, *Light and lighting*.

This first edition of ISO/CIE 17166 cancels and replaces ISO 17166:1999 | CIE S 007-1998, of which it constitutes a minor revision. The document has been editorially revised as per current ISO rules and the references have been updated.

Any feedback or questions on this document should be directed to the CIE Central Bureau or to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The problem of dosimetry in skin photobiology lies in the fact that the ability of ultraviolet (UV) radiation to elicit erythema in human skin depends strongly on wavelength, encompassing a range of four orders of magnitude between 250 nm and 400 nm. Thus, a statement that a subject received an exposure dose of 1 $J \cdot cm^{-2}$ (10^4 $J \cdot m^{-2}$) of UV radiation conveys nothing about the consequences of that exposure in terms of erythema. If the radiation source was a UV-A fluorescent lamp, no erythemal response would be seen apart from in people exhibiting severe, abnormal pathological photosensitivity. The same dose delivered from an unfiltered mercury arc lamp or fluorescent sun-lamp would result in marked violaceous erythema in most white-skinned individuals. Consequently, photobiologists have long recognized the need to express the exposure as an erythemally weighted quantity[1].

Recently, the term "minimal erythema dose (MED)" has been used widely as a measure of erythemal radiation. This is unreasonable because the MED is not a standard measure of anything but, on the contrary, encompasses the variable nature of individual sensitivity to UV radiation. Variables that affect the MED include: optical and radiometric characteristics of the source; determinants of the exposure, such as dose increment and field size; nature of the skin, such as pigmentation, previous light exposure and anatomical site; and observational factors, such as definition of the endpoint, time of reading after exposure and ambient illumination.

To avoid further confusing misuse of the term MED, it is proposed that this term be reserved solely for observational studies in humans and other animals, and that a new term, the "standard erythema dose (SED)", be used as a standardized measure of erythemogenic UV radiation.