

MEASUREMENT ERRORS IN THE ASSESSMENT OF EXPOSURE TO SOLAR ULTRAVIOLET RADIATION AND ITS IMPACT ON RISK ESTIMATES IN EPIDEMIOLOGICAL STUDIES

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Background and Aims: To date, many studies addressing long-term effects of ultraviolet radiation (UVR) exposure on human health have relied on a range of surrogates such as the latitude, ambient UVR levels, or time spent outdoors to estimate personal UVR exposure. This study aimed to differentiate the contributions of personal behaviour and ambient UVR levels on personal UVR exposure and to evaluate the impact of using UVR exposure surrogates on detecting exposure-outcome associations.

Methods: Data on time-activity was obtained from Expolis study (www.ktl.fi/expolis/) for adult (aged 25-55 years old) indoor workers in six European cities: Athens (37°N), Grenoble (45°N), Milan (45°N), Prague (50°N), Oxford (52°N), and Helsinki (60°N). Data on daily ambient UVR levels was obtained from Cost Action 726 (www.cost726.org/). Population-based data on holiday destinations of the corresponding countries to these cities were obtained from the Eurostat report on Tourism statistics. Annual UVR facial exposure levels were simulated for 10000 subjects in each city for 1997, using a behavioural UVR exposure model with data on time-activity, ambient UVR, and holiday destinations as inputs (Diffey 2008).

Results: Within-city variations of facial UVR exposure were three times larger than the variation between cities, mainly because of time-activity patterns. Ambient UVR levels, latitude and time spent outdoors alone accounted for less than one fourth of the variation in facial exposure levels. Use of these surrogates to assess long-term exposure to UVR resulted in requiring more than four times more participants to achieve similar statistical power to the study that applied true facial exposure.

Conclusions: Our results emphasise the importance of integrating both personal behaviour (time-activity and holiday behaviour) and ambient UVR levels/latitude in exposure assessment methodologies.

References: Diffey B (2008) A behavioral model for estimating population exposure to solar ultraviolet radiation. *Photochemistry and Photobiology* 84(2): 371-375.