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Utilising shade to optimize UV exposure for vitamin D

D. J. Turnbull and A. V. Parisi

Centre for Rural and Remote Area Health, University of Southern Queensland, Toowoomba, Queensland 4350, Australia

Abstract. Numerous studies have stated that humans need to utilise full sun radiation, at certain times of the day, to assist the body in synthesising the required levels of vitamin D₃. The time needed to be spent in the full sun depends on a number of factors, for example, age, skin type, latitude, solar zenith angle. Current Australian guidelines suggest exposure to approximately 1/6 to 1/3 of a minimum erythemal dose (MED), depending on age, would be appropriate to provide adequate vitamin D₃ levels. The aim of the study was to determine the exposure times to diffuse solar UV to receive exposures of 1/6 and 1/3 MED for a changing solar zenith angle in order to assess the possible role that diffuse UV (scattered radiation) may play in vitamin D₃ effective UV exposures (UV_{D₃}). Diffuse and global erythemal UV measurements were conducted at five minute intervals over a twelve month period for a solar zenith angle range of 4° to 80° at a latitude of 27.6° S. For a diffuse UV exposure of 1/3 MED, solar zenith angles smaller than approximately 50° can be utilised for exposure times of less than 10 min. Spectral measurements showed that, for a solar zenith angle of 40°, the UVA (315–400 nm) in the diffuse component of the solar UV is reduced by approximately 62% compared to the UVA in the global UV, whereas UV_{D₃} wavelengths are only reduced by approximately 43%. At certain latitudes, diffuse UV under shade may play an important role in providing the human body with adequate levels of UV_{D₃} (290–315 nm) radiation without experiencing the high levels of UVA observed in full sun.

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