

## SHADE AND MELANOMA-INDUCING WAVELENGTHS

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**Purpose of Study:** The UV spectrum under public shade structures has not been previously investigated. This research compares the UV spectrum beneath four common shade structures with that of total solar UV, for relatively cloud-free sky conditions and changing solar zenith angle. No action spectrum exists for human melanoma, but the fish melanoma action spectrum may possibly provide an indication of the effective wavelengths for human melanoma development.

**Methodology:** The protective nature of the shade environments was investigated by measuring the spectral UV in 1 nm increments in the shade for the three planes of horizontal, 45° and vertical, and comparing it to that on a horizontal plane in full sun. The solar UV in the shade of a shade umbrella, covered veranda, covered sandpit and covered walkway was measured for an increasing solar zenith angle, between March and August.

**Results:** For a shade umbrella on dry grass with no surrounding vegetation, UV levels in the shade weighted with the fish melanoma action spectrum reached approximately 65% of those in full sun. For a covered sandpit with trees and shrubs in close proximity, UV levels were less than half those for the shade umbrella. The covered walkway and northern facing veranda received potentially damaging UV levels of approximately 39% and 15% respectively, for fish melanoma. An increasing solar zenith angle increased the relative damaging UV in the shade.

**Conclusions:** The biologically damaging UV for fish melanoma was far from zero in the shade. This may have significant implications for humans.