



PHOTOBIOLOGY AND PHOTOPROTECTION

THE EFFECT OF SINGLE SUB-ERYTHEMAL DOSES OF SOLAR-SIMULATED RADIATION ON SKIN TOPOGRAPHY IN VIVO

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Introduction: It is well-established that cumulative, chronic exposure to sub-erythemal doses of solar ultraviolet radiation (UVR) results in degeneration of dermal connective tissue, loss of biomechanical strength and changes in skin surface topography (wrinkling, roughness). It is not known whether single sub-erythemal UVR doses change skin surface microtopography.

Objective: To investigate the effect of single sub-erythemal doses of solar-simulated UVR on skin microtopography.

Materials and Methods: 32 female subjects, aged 25-45, were recruited. Randomised sites on subjects' volar forearms were exposed to single sub-erythemal UVR doses (0.4MED), once daily, for 5 days. Another site was pre-treated with an SPF30 sunscreen formulation before irradiation. Another site served as an Untreated Control. A Breuckmann Dermatop instrument (using fringe projection) was used to capture skin 3D microtopography within each test site up to 6h after each irradiation on Days 1 and 5 and 24h after irradiation on Days 2, 3 and 5. Areal Roughness was computed for each site and used to investigate change in microtopography over the course of the study.

Results: Significant increases in areal roughness (Sa) vs Untreated Control were found within 6h of a single irradiation of 0.4MED solar-simulated UVR, on Days 1 and 5. Moreover, higher roughness vs Untreated Control was measured 24h after irradiation on Days 2, 3 and 5. Within the site pre-treated with an SPF30 sunscreen formulation, however, significant decreases in areal roughness were measured at all timepoints vs Untreated Control, within 6h of irradiation or 24h after irradiation.

Conclusions: Single, sub-erythemal doses of solar-simulated UVR can increase skin surface roughness within hours of irradiation, a phenomenon which persists at least 24h. The mechanism behind this observation is not yet clear, but provides further evidence of the ability of even single non-sun-burning doses of solar UVR to elicit significant deleterious





effects within skin.

