PHOTOBIOLOGY AND PHOTOPROTECTION

A TALE OF TWO SKIN TYPES: HISTOLOGIC VARIATIONS IN VISIBLE LIGHT RESPONSE

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Introduction: Visible light (VL) comprises 44% of the solar spectrum. While effects of VL on the skin appear less substantial compared to ultraviolet, VL is still believed to contribute to photodamage. We previously reported that VL at high power (200mW) differentially causes a phototoxic effect in skin of color seen as vesiculation, whereas lighter skin types develop transient erythema.

Objective: We aim to observe the histologic differences underlying the unique clinical responses to VL.

Materials and Methods: We evaluated samples of two skin types (light=5;dark=3), each with a control and VL treated site. Treatment sites were irradiated with VL(480 J/cm2, 200mW x40 min for 4days) using a Fiber-Lite High Intensity Illuminator (Series 180, Dolan Jenner Industries, Inc.; VL 95.3%, infrared 3.2%, UVA1 1.5%). Samples were stained with hematoxylin and eosin(H&E) and Fontana Mason(FM) for morphology and pigmentary changes, respectively. p53 immunohistochemistry was used to assess photodamage(n=2).

Results: Light skin treatment and control sites had no significant differences, with mean fold change(FC) of 1.16 in epidermal thickness in treatment sites compared to control. In contrast, dark skin had marked epidermal thickening (FC=2.24), spongiosis, focal epidermal necrosis and apoptotic keratinocytes with moderately dense perivascular infiltrates. FM showed upward redistribution of melanin from the basal layer in dark skin types, with no visible changes in light skin. Following VL, light skin had greater p53 positive cells (30/hpf) compared to 8/hpf in control. Dark skin had p53 positive cells(14/hpf) in treatment site, compared to no p53 positivity in control.

Conclusions: While dark skin showed more significant morphologic changes correlating with our previous clinical findings, light skin appeared to sustain greater photodamage from VL. Although preliminary, these findings highlight the differential effects of VL across ethnicities, as well as its role in photodamage. This is particularly relevant given the increased diversity of our patient population.