

# IN VIVO NONLINEAR SPECTRAL IMAGING MICROSCOPY OF VISIBLE AND ULTRAVIOLET IRRADIATED HAIRLESS MOUSE SKIN TISSUES

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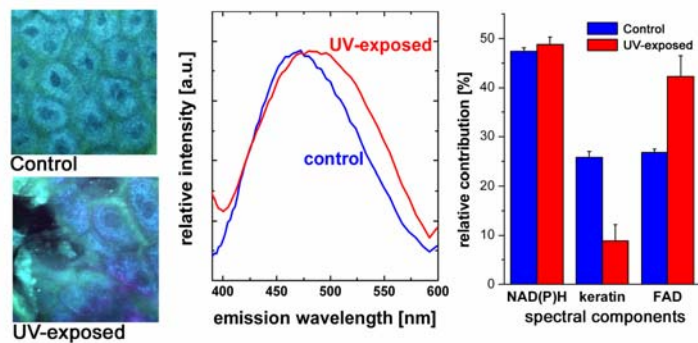
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It is well known that ultraviolet radiation can give rise to cellular damage by direct excitation of DNA and indirect mechanisms that involve the excitation of cellular chromophores or endogenous photosensitizers. However, the effects of visible light has been less extensively studied, even though there have been reports that visible light can induce cellular dysfunction and even cell death [1]. Although there has been no single mechanism established, most studies point to the formation of reactive oxygen species (ROS). High amounts of ROS impair the antioxidative defence systems of the skin, causing damage to proteins, lipids, RNA and DNA, and finally may lead to cutaneous inflammatory disorders, photoageing and skin cancer. In this study, we used nonlinear spectral imaging microscopy (NSIM) [2,3] to investigate both the morphological alterations and biochemical changes following UV and visible irradiation of mouse skin in vivo. The acquired three-dimensional images and spectra are based on the nonlinear-excited intrinsic emission of the skin: two-photon excited autofluorescence and second harmonic generation. The aims of the study were: 1) to determine the morphological alterations based on the acquired images and; 2) to identify the biochemical changes based on spectra of the different tissue layers, and thus to better understand the effect of UV and visible irradiation of skin.



**Figure 1.** In vivo color spectral images of control and UV-exposed mouse skin (left), corresponding average spectra (middle) and relative contributions of NAD(P)H, keratin and FAD obtained by linear spectral unmixing (right).

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