

The Size of the Melanosome and Photodamage of DNA

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Our earlier studies have demonstrated that exposure of Caucasoid skin to longwave uv light after the application of psoralens resulted in an increase in the average size of the melanosomes and changes in the distribution pattern of melanosomes within the keratinocytes.

The photobiologic mechanism responsible for the changes in the size of melanosomes is still not clear. However, the action spectrum responsible for the changes in the size of melanosomes can be determined with the use of a high-intensity uv light monochromator.

The photobiologic effects of monochromatic and polychromatic light on the pigmentary system of human skin are investigated under different experimental conditions, e.g., (1) in normal human skin after topical or oral administration of psoralens and ultraviolet light (uvl) irradiation; (2) in the skin of xeroderma pigmentosum after uvl; (3) in normal human skin, after Bleomycin injection and uvl; and (4) in normal human skin after repeated exposure for a prolonged period to uvl.

In all of the four experiments reported here, an increase in the size of the melanosomes within the keratinocyte has been observed.

Both under *in vitro* and *in vivo* conditions, psoralens photoreact with native DNA, forming C₄-cycloadducts with pyrimidine bases. Besides this monofunctional photoaddition reaction, psoralens can photoreact as bifunctional reagents and give interstrand cross-linkages in the native DNA of epidermal cells. Repair synthesis of uv-damaged DNA after psoralen treatment and uv irradiation can be demonstrated in normal epidermal cells in about 12–20 hr, but not in those for xeroderma pigmentosum. Additional investigations revealed that Bleomycin and other drugs also inhibit the repair–replication of photodamaged DNA.

These results suggest that photodamage of DNA in the epidermal cells may modify the size of the melanosome in the epidermal melanin unit. They also indicate that cellular genetic information in DNA is a more important factor than the turnover rate of the keratinocyte in determining the size of the melanosome.