PHOTOBIOLOGY AND PHOTOPROTECTION

SUNSCREEN PROTECTION AGAINST UVR-INDUCED DNA DAMAGE

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Introduction: Today, sunscreen protection is characterized by the Sun Protection Factor (SPF)which measures the ability of a formulation to decrease the UVR dose leading to erythema, which is an acute inflammatory response. SPF does not directly reflect the protection against long term adverse effects such as skin cancer. For this reason, the formation of DNA photoproducts caused by solar UVR exposure needs to be investigated in-vivo.

Objective: The study's purposes were: to evaluate if the roof of suction blisters is an appropriate sampling method for measuring photoproducts, and to measure in-vivo sunscreen protection against cyclobutane pyrimidine dimers (CPD).

Materials and Methods: Skin areas on the interior forearms of eight healthy volunteers were exposed in-vivo to 2 MED of simulated solar radiation (SSR) and to 15 MED on a sunscreen protected area. After irradiation, suction blisters were induced and the blister roofs were collected. Analysis of SSR-induced CPDs was performed by two independent methods: a chromatography coupled to mass spectroscopy (HPLC-MS/MS) approach and a 3D-imaging of CPD-immunostaining by multiphoton microscopy.

Results: HPLC-MS/MS analyses showed that SSR-unexposed skin presented no CPD, whereas 2 MED SSR-exposed skin showed a significant number of CPD. The sunscreen-covered skin exposed to 15 MED appeared highly protected from DNA damage, as the amount of CPD remained below the detection limit. The multiphoton-immunostaining analysis consistently showed that no CPD staining was observed on the non-SSR-exposed skin. A significant increase of CPD staining intensity and number of CPD-positive cells were observed on the 2 MED SSR-exposed skin. Sunscreen-protected skin presented a very low staining intensity and the number of CPD-positive cells remained very close to non-SSR-exposed skin.

Conclusions: This study showed that suction blister samples are very appropriate for

measuring cyclobutane pyrimidine dimers in-vivo, and that the sunscreen provided high protection against UVR-induced DNA damage.