

EFFECT OF SUNSCREEN ON PROTOPORPHYRIN IX PHOTBLEACHING IN EX VIVO HUMAN SKIN

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BACKGROUND

Metvix®-photodynamic therapy (PDT) is a successful treatment for non-melanoma skin cancers. Methyl-aminolevulinate, the active ingredient of Metvix®, is a prodrug that is metabolized to protoporphyrin IX (PpIX) which accumulates in the skin lesion. Light activation of accumulated porphyrins leads to a photochemical reaction and thereby phototoxicity to the light-exposed target cells. However, pain related to illumination during conventional Metvix®-PDT is a severe side effect. Replacing conventional PDT by daylight PDT may represent a new strategy to reduce pain related to illumination. Subjects are advised to protect the non-treated areas with sunscreen. The choice of sunscreen is particularly important as physical filters within sunscreen (such as Titanium or zinc oxide) may inhibit the absorption of visible light which is necessary for PpIX activation. The main objective of this work was to investigate the effect of sunscreen on PpIX photobleaching in ex vivo human skin.

METHODS

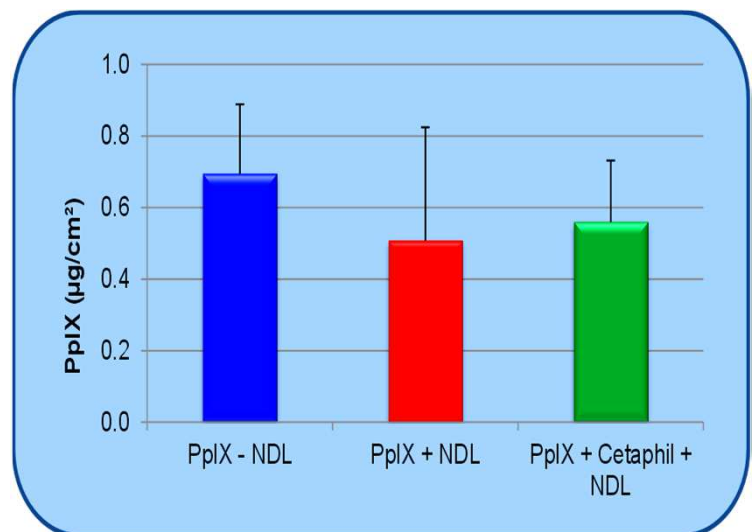
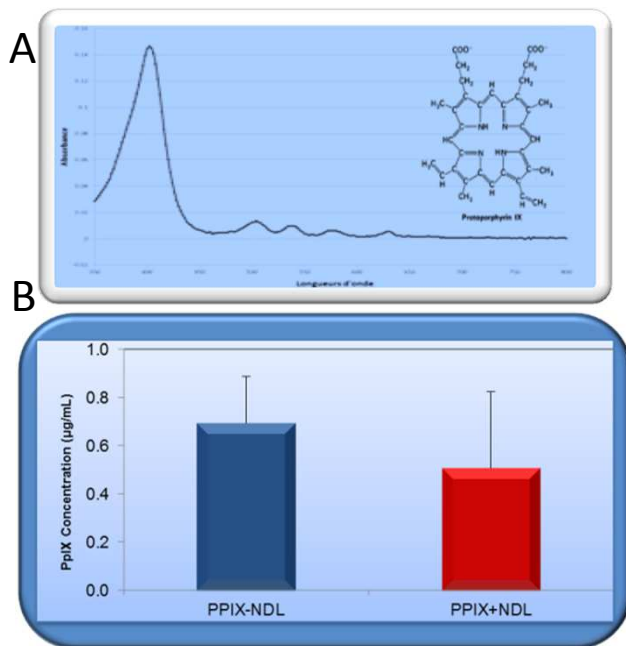
Freshly excised human skin samples (from at least 3 donors) were treated with PpIX solution in DMSO (100 µg/cm²) for 1 hour at 37°C, 5% CO₂. To improve PpIX penetration, skin samples were dermarolled using MC410 dermaroller model prior to PpIX application. Sunscreen (Cetaphil SPF30) was then applied to skin surface (10 µL/cm²). Control skin samples were not treated with sunscreen. All samples were exposed to sunlight simulator for 1 hour (NDL). Afterwards, PpIX concentrations in receptor fluid as well as in skin extract were analyzed by HPLC with fluorescence detection.



RESULTS

Figure 1: A- Chemical structure and absorption spectra of PpIX. B- Effect of sunlight simulator on PpIX content in skin extract.

Figure 2: Effect of sunscreens on PpIX content in skin samples. Data represent mean +/- SD of three donors



DISCUSSION

- Exposure of ex vivo human skin samples treated with PpIX to solar simulator induced a 25% decrease in PpIX content in skin extract as compared to unexposed skin samples (Figure 1B)
- Treatment of skin samples with sunscreen (Cetaphil SPF30) prior to exposure to sunlight simulator (NDL) had no statistical significant effect on PpIX content in skin extract (Figure 2), indicating that there is no interaction between sunscreen and solar simulator.

CONCLUSION

The sunscreen tested Cetaphil SPF30 had no statistically significant effect on PpIX photobleaching in ex vivo human skin. This indicates that there was no significant interaction between the sunscreen and solar simulator in the in vitro conditions. Therefore, Cetaphil SPF30 is unlikely to modify the efficacy profile of Metvix.