

# **A water-based *P. cruentum* extract has demonstrated its protective effect on the skin against UV rays and pollution in *in-vitro* and *ex-vivo* skin models**

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## **OBJECTIVE**

*Porphyridium cruentum* grows in the Negev desert where UVs exposure is high and produces molecules as phycoerythrin involving in light energy harvesting and exopolysaccharides known to chelate heavy metal ions. From this observation of nature, beneficial effects on the skin were assumed against UVs and pollution. In this sense, *in-vitro* and *ex-vivo* studies have been performed to demonstrate the ability of a water-based extract from *P. cruentum* to protect the skin against UVs, blue light and urban pollution.

## **METHODS**

The water-based *P.cruentum* extract characterized in phycoerythrin and exopolysaccharides was produced industrially.

This extract was tested on Reconstructed Human Epidermis irradiated with UVs for sunburn cells quantification (Hematoxylin/Eosin staining) and on human skin explants exposed to UVs or to UVs and pollutants for DNA degradation assessment ( $\gamma$ H2AX immunostaining).

The protective effect of glycerin with 5% of *P.cruentum* extract was evaluated by measuring the transmittance through PMMA sunplates before and after irradiation.

## **RESULTS**

The results obtained on RHE show that the extract has a significant decrease of 88% ( $p < 0,05$ ) of the number of sunburn cells formed after UVs stress, compared with untreated RHE.

The results obtained on explants exposed to UVs stress, or to UVs-pollutants stress, demonstrate that:

-The extract has a significant decrease of 85% ( $p < 0,01$ ) of  $\gamma$ H2AX expression in comparison with the negative control when the explant is exposed to pollution.

-The extract has a significant decrease of 39% ( $p < 0,01$ ) of  $\gamma$ H2AX expression in comparison with the negative control when the explant is exposed to pollution and UVs.

The extract formulated in glycerin shows a protection factor of 15% (moderated action) against blue light.

## **CONCLUSION**

The microalga extract has demonstrated through *in-vitro* and *ex-vivo* tests its protective effect on the skin against the harmful effects of UVs combined with pollution. As suggest, the mechanisms of action that can explain these results could be linked to the two contained molecules: the phycoerythrin (light harvesting pigment) and exopolysaccharides (heavy metals chelators). Furthermore, the structure between phycoerythrin and bilirubin is close: the extract could activate the same mechanisms than the bilirubin and especially the NRF2 pathway (a natural protection mechanism against oxidative stress).

## **KEYWORDS:**

Microalga ; biomimetism ; UV ; pollution ; blue light