ABSTRACT

**Background:** Actinic keratoses (AKs) are considered to be a 'field of cancerization' consisting of a histologically abnormal epithelium adjacent to tumour tissue. Treatment of the 'field of cancerization' is important for the prevention of neoplasm progression. UV radiation, especially UVB, produce genotoxic photoproducts such as cyclobutane pyrimidinedimers (CPDs) and 6-4 photo-products (6-4PPs) in DNA, being major players in skin cancerization. The potential use of DNA photolyases in skin cancer prevention is increasingly being demonstrated. Topical application of a liposome formulation containing CPD photolyase onto human skin provides protection against UV-B-induced damages. **Objectives:** To assess the effects of topical application of a medical device (Eryf-AK) containing a DNA-repair enzyme, photolyase, encapsulated in liposomes and UV filters, on cancerization field in actinic keratosis (AK).

**Methods:** 13 AK patients were included. Clinical, dermoscopic, and reflectance confocal microscopy (RCM) assessments, as well as skin biopsies, before and after a 4-week treatment were performed. Patients used Eryf-AK twice daily or only a sunscreen (3:1) with a similar sun protection factor (SPF) for one month. **Results:** Erythema and scaling improved with Eryf-AK. RCM showed a reduction in scaling, detached corneocytes and polygonal nucleated cells in the stratum corneum (p=0.004, p=0.018, and p=0.021), an improvement of the atypical honeycomb pattern, and a decreased number of round nucleated cells at the spinous granulous layer (p<0.0005 and p=0.019) with Eryf-AK while no improvement was noted with the sunscreen product. The mean RCM score for AK significantly improved from 0.78 to 0.27 (p=0.002) with Eryf-AK. Histological clearance of AK in 4 cases and an improvement with a focal AK associated with inflammation in 3 additional patients were also observed with Eryf-AK. A decrease in p21 expression (p=0.042) and a tendency to decrease PCNA expression was also observed with Eryf-AK (p=0.076). **Conclusion:** Our results show a benefit from Eryf-AK in the treatment of AK cancerisation field. The improvement was demonstrated clinically, by RCM, histologically and by immunohistochemistry. An improvement was also observed in the two patients with xeroderma pigmentosum, suggesting a benefit from this topical treatment in patients with this rare genetic disorder.