POSITIVE CONTRIBUTION OF ACTIVE MOLECULES COMBINED WITH SUN FILTERS EVALUATED BY *IN VIVO* BIOMARKERS ANALYSIS

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INTRODUCTION & OBJECTIVES

Skin photoprotection has become a real public health issue in view of consequences of the sun on unprotected skin such as erythema, immunosuppression, and skin cancer. The major role of UVA rays has long been neglected, in spite of their harmful effect over the long term, notably by generating oxidative stress. To prevent it, it has become important to provide biological protection in addition to sun filters.

The aim of this study was to evaluate the photoprotective complementary efficacy of an active complex with sun filters (compared to the active complex alone or sun filters alone) on volunteers exposed to UVs by measuring squalene oxidation, catalase activity and trans-urocanic acid (trans-UCA).

MATERIAL & METHODS

- **Volunteers** This study was conducted on 10 males.
- **Protocol timeline** From day 0 (D0) to D2 included, the studied products (formulated in an emulsion) were applied (2mg/cm², twice daily) on the back of volunteers: placebo; sun filters SPF 30; the active complex (ectoine and mannitol); sun filters SPF 30 in association with the active complex. At D3, a 2 MED UV exposition was performed and at D4, skin surface samplings were done by swabbing.
- **Biochemical analyses** Squalene oxidation and urocanic acid were measured by LC-MS. Catalase activity was assessed using resorufin which fluoresces after oxidation.
- **Statistical analyses** Normality was first checked to determine the right statistical test to applicate. If hypothesis of normality was approved, a Student's t-test was used, and if not, a Wilcoxon test. If the p-value was less than 0.05, the difference was significant.

RESULTS

- **UV irradiation** Compared to non-irradiated placebo condition, UV irradiation induced squalene oxidation by 2-fold, a decrease of catalase activity by 1.5-fold and a photo-isomerization of UCA by 5-fold.
- **Ingredients alone** Compared to the irradiated placebo, the active association and UV filters alone protected squalene oxidation by 58.4% (p<0.01) and 50.6% (p<0.01), catalase activity by 60.5% (p<0.01) and 53.7% (p<0.01), and UCA photo-isomerization by 14.2% (p<0.01) and 30.0% (p<0.01), respectively.
- **Combination of the active association with UV filters** provided the best protection of squalene oxidation (76.8%;p<0.01), catalase activity (84.4%; p<0.001) and UCA isomerization (53.9%; p<0.01). Compared to filters alone, the active complex added to filters provided **significant additional protection** of squalene by 26% (p<0.05), catalase activity by 31% (p<0.05) and trans-UCA synergistically by 24% (p<0.01).

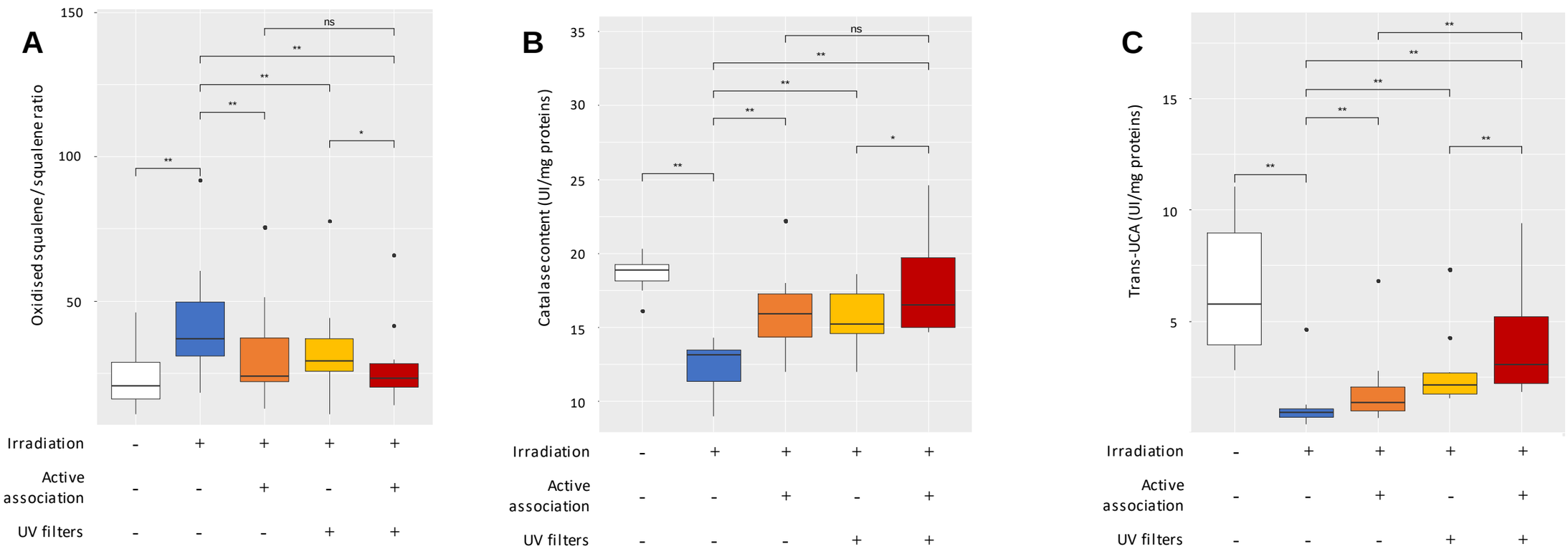

Figure 1 : *In vivo* quantification of the oxidized squalene/squalene ratio (A), catalase content (B) and trans-UCA (C). The results are presented as box plots, with whiskers representing the maximum values or 1.5 times the interquartile range of the data, whichever was smaller. Wilcoxon's signed-rank test for squalene. *p<0.05, **p<0.01, and ***p < 0.001; ns=not significant.

CONCLUSION

This *in vivo* study performed on specific biomarkers demonstrates the interest of combining UV filters with a biological protection to prevent UV damages induced by sun exposure such as induction of oxidation, decrease of endogenous antioxidant defence systems and induction of photo-immunosuppression.