Lu, Wenjia; Jiang, Yueming; Qu, Xin*
Shanghai Technical Center, ASHLAND LLC, Shanghai, China

Assessing skin photo oxidation by measuring stratum corneum carbonylated protein level and the anti-photo oxidation effect of sandal wood extract

SC_237

Lu, Wenjia; Jiang, Yueming; Qu, Xin*
Shanghai Technical Center, ASHLAND LLC, Shanghai, China

Introduction:

The sunlight, mainly because of the ultraviolet (UV) radiation, can generate reactive oxygen species (ROS) and cause lipid peroxidation by oxidizing the unsaturated fatty acids of stratum corneum (SC) lipids and produce reactive carbonyl species (RCS).

Under the continuous or cumulative irradiation, the excessive and unbalanced RCS will induce protein carbonylation, which may cause structural changes and dysfunction of biological macromolecule and even speed up the skin aging process.

So that stratum corneum carbonylated protein (SCCP), induced by photo oxidation, could be used as a marker to measure the photo damage of the skin[1].

Materials & Methods:

A simple, visible and noninvasive *ex-vivo* SCCP method by collecting tape-stripped samples and fluorescent tagging was developed and used to evaluate the mitigative capacity of sandalwood extract to the skin photo oxidation.

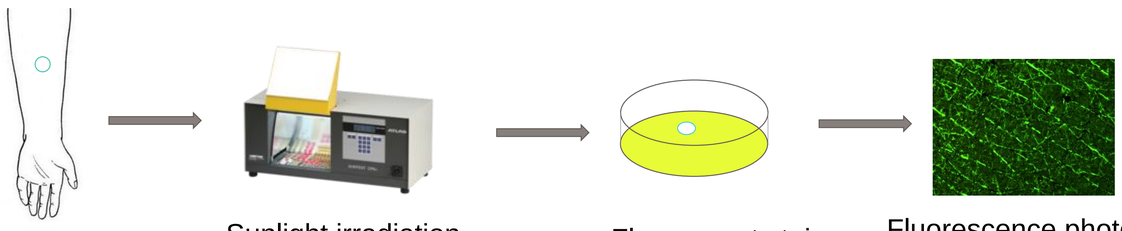

Fig.1 *Ex-vivo* method to determine SCCP level

Furthermore, 30 volunteers with tanned skin were recruited for a 28-day clinical study, the skin luminance and skin hydration of normal area both on face (sunlight exposed area) and arm (in autumn, unexposed area) as well as skin firmness and wrinkle applied with creams containing 1% sandalwood extract compared with placebo or blank control were tested.

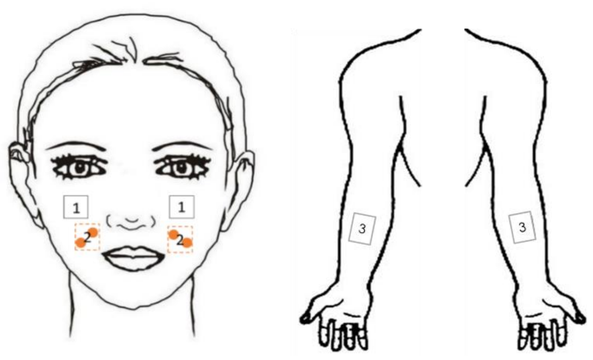

Fig.2 Test sites and parameters in clinical study
1,3: Measurement area of skin color and skin hydration
2: Measurement area of skin firmness

Results & Discussion:

SCCP level raised with increasing of irradiation time, indicates the sunlight irradiation induces cumulative damage to SC proteins.
The ex-vivo result showed SCCP level was significantly inhibited by the sandalwood extract ($p<0.05$), indicating it could reduce the photo damage and protect skin against photo oxidation condition.

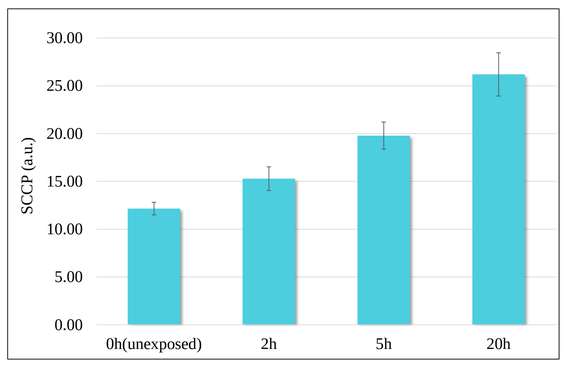

Fig.3 Relationship between SCCP level and irradiation time, n=6

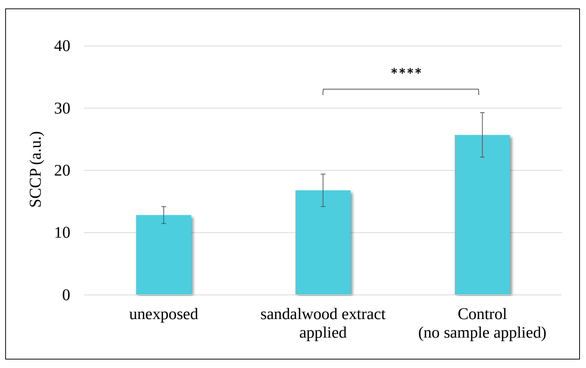

Fig.4 Change of SCCP level after applying sandalwood extract and irradiation for 15h n=5, ****: $p<0.001$

The clinical study results showed formula containing 1% sandalwood extract can significantly improve skin luminosity on face, as an exposed body site, at D14 and D28 ($p<0.05$,) and on volar side of forearm, as unexposed area at D14 ($p<0.01$).
Skin firmness and wrinkles were also significantly improved by sandalwood extract at D28 ($p<0.05$). Compared to placebo side, skin regeneration was accelerated by sandalwood extract and it could be used in sunscreen or skin recovery products before/after sun exposure.

Conclusions:

The developed SCCP method could be used to evaluate the skin photo damage by sunlight irradiation. By this method, we found the cumulative skin damage produced as the time of sunlight exposure increases.

The sandalwood extract could mitigate the photo oxidation in the *ex-vivo* experiment. Moreover, it could improve skin luminosity, skin hydration, skin firmness and wrinkles in the *in-vivo* test even the skin was naturally tanned before the test. It shows the sandalwood extract might bring a new trend in cosmetics industry.

Acknowledgments:

The authors thank the Vincience Lab in France for the basic and skillful technical support.

References:

[1] Li G, Yin D (2008) Protein carbonylation and aging. Chinese Journal of Gerontology, 28(20): 2070-2073. DOI: 10.3969/j.issn.1005-9202.2008.20.046.