

Shiseido Finds Regional Differences in Oxidative Stress in Face via Biophoton Measurement

- Oxidative stress level closely correlated with aging and wrinkle formation -

Shiseido Company, Limited (“Shiseido”) has succeeded in evaluating on a “whole face” scale the oxidative stress^{*1} which accumulates in the skin due to damage such as from UV, by applying biophoton (UPE)^{*2} measurement technology through an ultra-sensitive cooled CCD (Charge Coupled Device) camera in joint research with Tohoku Institute of Technology. The team then revealed for the first time that there are regional differences in the oxidative stress of the face. Furthermore, the team also found that, by using this technology, the oxidative stress level increases with age and is closely correlated with wrinkle formation.

Based on this finding, Shiseido will further conduct research and development with the aim of utilization in various fields, such as the development of appropriate skincare and sun care products according to the oxidative stress of each skin region, and the recommendation of more effective methods of use.

These research results was presented in the Poster Presentation category at the IFSCC^{*3} Conference 2019 held in Milan, Italy from September 30 to October 2, 2019.

^{*1} Oxidative stress deteriorates skin’s natural ability to maintain moisture, clearness and resilience etc.

^{*2} Biophoton (UPE; ultraweak photon emission): An extremely faint light generated from living organisms and invisible to the human eye. Details are described in the section below.

^{*3} IFSCC (The International Federation of Societies of Cosmetic Chemists): An international organization dedicated to the development of highly functional and safe cosmetic technology through the world-wide cooperation of cosmetic societies.

Biophoton (UPE) generated from the skin

It is known that the skin generates extremely faint light called biophoton (UPE), which is invisible to the human eye, and this faint light increases with oxidative stress. In 2018, by using an ultrasensitive cooled CCD camera, Shiseido non-invasively captured an image of biophoton and precisely visualized the oxidative stress of the human skin. Through this technology, the team succeeded in providing visual proof that sunscreen defends against UV and protects the skin from oxidative stress, and that green tea leaf extract contained in cosmetics has the effect of suppressing oxidative stress accumulated in the skin due to damage such as from UV.

Regional differences in oxidative stress in the whole face

Biophoton (UPE) is extremely faint light, requiring advanced technology to visualize, and while it was extremely difficult to accurately observe on a wider scale, this time, the team succeeded in evaluating the oxidative stress of the whole face. As a result, it was found that skin regions between the eyebrows and around the nose are most vulnerable to oxidation compared to others, which is possibly because these facial regions are more likely to be exposed to UV and also contain a lot of sebum. This suggests the importance of appropriate care according to skin region, such as frequent application of sunscreen and thorough skincare.

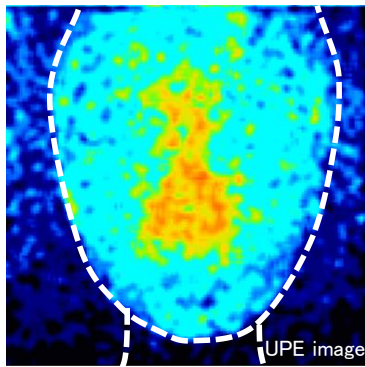


Figure 1. Visualization of oxidative stress of the whole face; there are regional differences in oxidative stress of the face

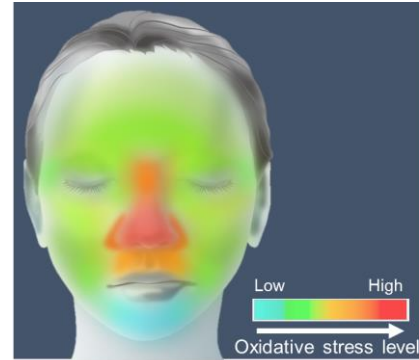
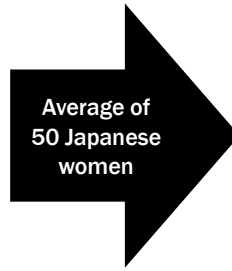


Figure 2. Oxidative stress level of the whole face (composite image)

Relationship between oxidative stress in the skin and aging/wrinkle formation

Using this measurement technology, the team evaluated the oxidative stress of the skin around the eyes of women in each age group, and found that the oxidative stress level of the skin increased in accordance with age and that the higher the level, the greater the score of wrinkles formed.

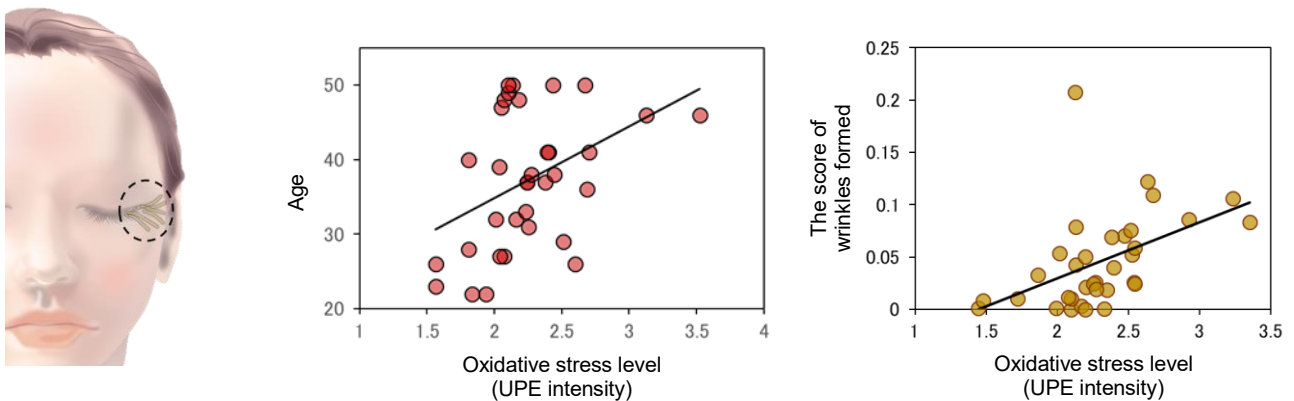


Figure 3. Oxidative stress of the skin is closely correlated with aging/wrinkle formation

Oxidative stress in the skin due to UV is considered one of the causes of photoaging^{*4}. Facial skin in particular is exposed to UV during the day throughout the year, so it is especially important to apply skincare on a daily basis. Based on the research results accumulated so far, Shiseido will pursue development of skincare and sun care products that protect the skin from oxidative stress.

^{*4} Photoaging refers to the skin aging phenomenon of such as “dark spots/wrinkles” caused by UV in sunlight. This is a major cause of skin aging.

【Reference materials】 Related past technology releases

•2018: Shiseido Visualized the Protective Effect of Sunscreen Against UV-Induced Oxidative Damage in the Skin

<https://www.shiseidogroup.com/news/detail.html?n=0000000002477>