

## Shiseido Discovers that Balance of Internal Skin Elasticity is Root Cause of Wrinkles

- Development of cutting-edge technology for 3D image of internal and external skin elasticity -

Shiseido Company, Limited (“Shiseido”) has independently developed cutting-edge technology for imaging skin elasticity in three dimensions and successfully observed the root cause of wrinkles, including invisible wrinkles\*<sup>1</sup>. Using this technology, we analyzed the mechano-physical properties of skin for consumers in various age groups, from young to senior, and found that the “balance of elasticity between the stratum corneum and the dermis” deteriorates with age, concluding that such phenomenon is the root cause of wrinkle formation. Until now, the treatment approach to wrinkles has targeted visible wrinkles, and applied creams containing anti-wrinkle agents, etc. However, we found that not only visible wrinkles, but also invisible wrinkles at the pre-wrinkle stage can be improved while skin-caring both on the outside and within and eliminating the imbalance of skin elasticity. This study provided important findings that can lead to an epoch-making anti-aging skincare solution that prevent and improve wrinkles at both pre-wrinkle and fixed-wrinkle stages. Going forward, Shiseido will utilize these findings in the design of various products as a new approach to anti-aging skin care.

A part of these study results was presented at the 31st IFSCC Congress 2020 held in Yokohama, Japan from October 21 to 30, 2020.

\*<sup>1</sup> Joint research with Honda Electronics Co., Ltd., Toyohashi University of Technology, and Toyota Technological Institute

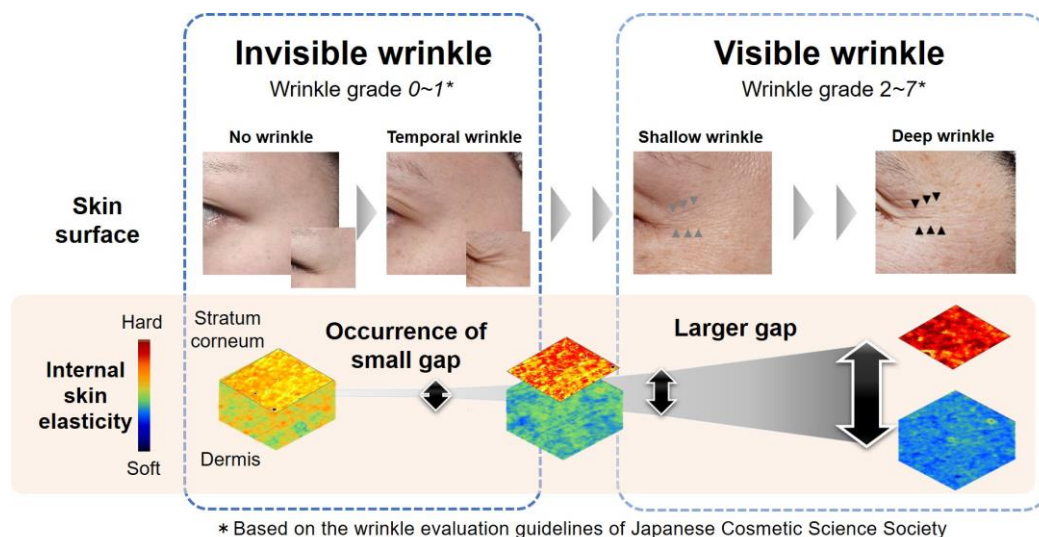


Figure 1. Process of wrinkle formation (image)

### Original ultrasound technique for 3D imaging of skin elasticity

Until now, the mechanical properties of the skin have generally been evaluated considering skin as “one object”, for instance, how skin bounces against the forces of pressure, etc. However, as skin consists of multiple layers with different properties, a technique was required that can evaluate properties by layer to accurately understand mechanical properties of the skin. We utilized an ultrasound technique and developed new technology to analyze depth-specific elastic properties in the skin (repulsive force when pressed), previously impossible using the conventional method\*<sup>2</sup>. With this most advanced ultra-high

resolution and ultrasonic technology, it has become possible to evaluate a skin region with a thickness of one micron (1/1000 of 1 mm) and accurately analyze elastic properties by layer, even in a thin layer such as the stratum corneum, measuring only a few tens of microns.

\*2 Obtained Patent No. 6361001

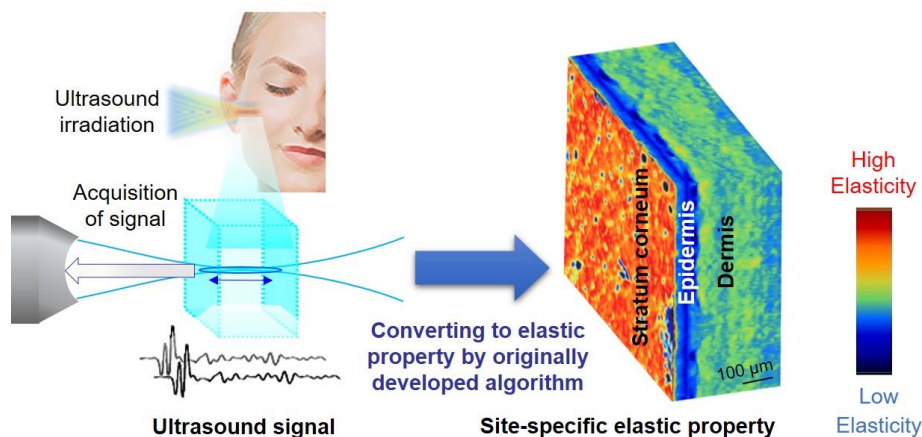


Figure 2. Evaluating mechanical properties (elastic properties) of a target via sound signal transmission

**Wrinkles are caused by elasticity gap between stratum corneum and dermis**

Using the above evaluation technology, we analyzed the mechanical properties of skin in 130 Japanese women aged 20s to 60s and evaluated the elastic properties of each skin layer. As a result, we found that the stratum corneum became harder with age whereas the dermis became softer, and the more the elasticity gap between the stratum corneum and the dermis expands, the deeper the wrinkles become. Furthermore, in terms of young skin with no visible wrinkles, those who have a larger elasticity gap between the stratum corneum and the dermis are more likely to form wrinkles when the skin is deformed, such as during facial expressions. This result suggests that the balance in elastic properties between the stratum corneum and the dermis is closely related to the state of wrinkles at all stages.

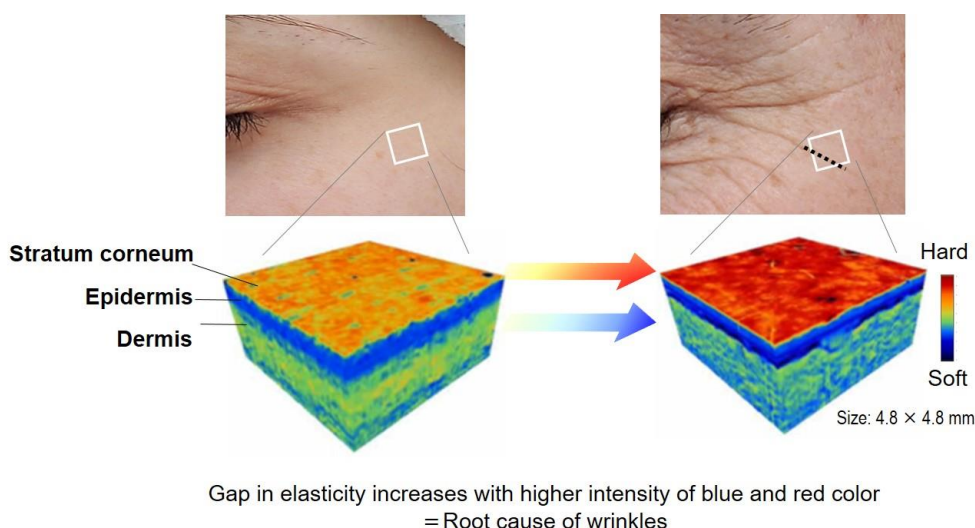


Figure 3. Occurrence of elasticity gap between stratum corneum and dermis

**Wrinkles fundamentally improved by eliminating elasticity gap between stratum corneum and dermis**

We asked female volunteers in their 40s to apply a cream formulation containing simple form of retinol as well as moisturizing and softening agents repeatedly for four weeks, and analyzed the mechanical properties of the skin before and after the application by the technique developed and described above.

As a result, it was revealed that the elastic properties were resolved no matter whether wrinkles are visible or invisible. At the same time, it was found that not only visible wrinkles were improved, but temporal wrinkles that appear during facial movements (facial expressions) were also significantly reduced even in skin at pre-wrinkle stage (Figure 4). Based on these results, we confirmed that a skin care approach combining caring both on the outside and within can improve “wrinkle-proneness” that develops within the skin even before wrinkles appear.

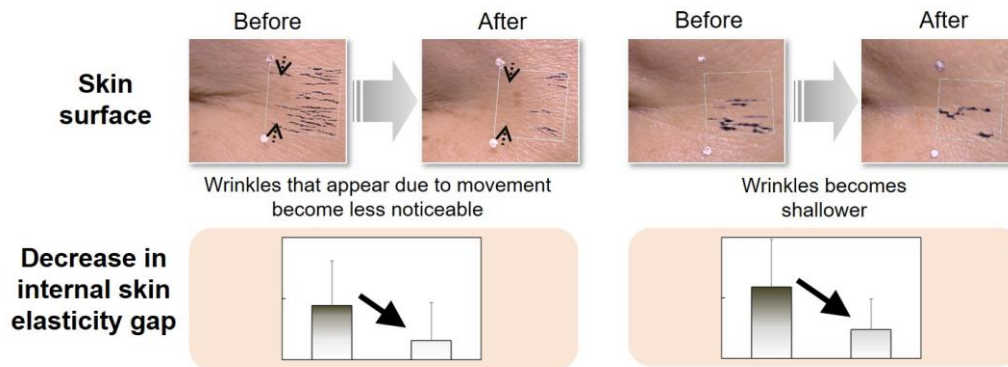


Figure 4. Wrinkles improved at all stages (eliminating elasticity gap before appearance)

#### Future deployment

Shiseido has always responded to consumers' needs through various research and innovation, such as developing active ingredient “simple form of retinol” that achieved not only high efficacy but also safety, and introducing it for wrinkle improvement which has been well-received by the market. The results of this study are important discoveries approaching the root cause of wrinkles, and by monitoring not only deep wrinkles but also pre-wrinkles that are outwardly invisible, it is expected to lead to a new approach to anti-ageing skin care.

Going forward, Shiseido will utilize the findings of our cutting-edge research and continue to carry out innovative studies to solve skin concerns for customers around the world.

#### Related news releases

Shiseido Succeeds in Visualization of Internal Skin Elasticity (2018)

<https://corp.shiseido.com/en/news/detail.html?n=0000000002423>