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Tracking Changes Inside the Skin Accompanying Changes in Stratum Corneum Condition Using SSL-RNA from Living Skin

Possibility That When the Stratum Corneum Condition Improves, the Skin Moves Toward its Inherently Healthy State

Kao Corporation's Skin Beauty 1 Products Research has confirmed, through the expression level of SSL-RNA*¹, the changes occurring inside the skin that accompany changes in stratum corneum condition. The results indicated that when the stratum corneum condition improves, not only the expression of RNA involved in the barrier function of the skin surface, but also the expression of RNA involved in a variety of functions inside the skin changes. This result suggests the possibility that, with improvement in stratum corneum condition, the skin as a whole moves toward being able to fulfill its inherent functions.

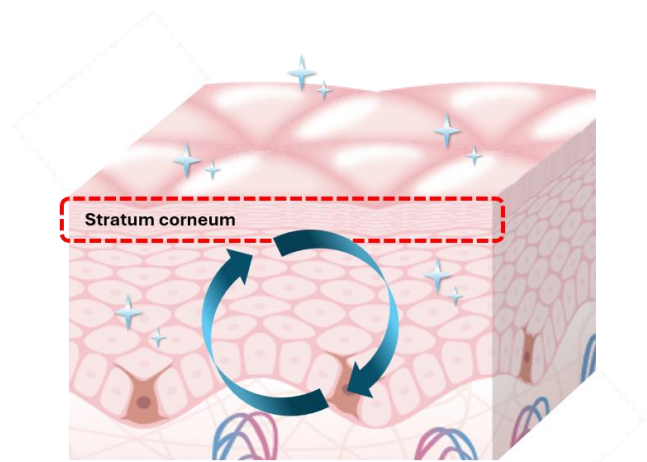


Illustration of the effect of stratum corneum condition on the inherent health of the skin

Part of the findings of this research was presented at the 51st Convention of the Japanese Cosmetic Science Society (June 25–26, 2026, Tokyo).

*1 Kao News Release, June 10, 2019:

[Kao's original non-invasive analytical method for monitoring RNA—Discovery of the presence of human RNA in sebum](#)

Related paper: Commun. Biol.5, 215 (2022). [Non-invasive human skin transcriptome analysis using mRNA in skin surface lipids](#)

Background

The stratum corneum, the outermost layer of the skin, is responsible for barrier functions including protection against external irritants and suppression of transepidermal water loss. Based on the philosophy that maintaining favorable stratum corneum condition leads to beautiful skin, Kao has been pursuing the development of technologies that improve stratum corneum condition through a variety of approaches. On the other hand, what occurs inside the skin when stratum corneum condition changes had been difficult to evaluate in living human skin, and had not been fully understood.

SSL-RNA monitoring technology*¹, which Kao established in 2019, enables precise analysis of the current condition of the skin and body from RNA contained in facial sebum without damaging the skin. Kao therefore

applied this method to closely examine the expression level of RNA accompanying changes in stratum corneum condition, to capture changes inside the skin.

Changes in SSL-RNA expression accompanying improvement in stratum corneum condition

Kao studied changes in stratum corneum condition in 20 Japanese women aged in their 30s to 50s who had concerns about dryness and redness, having them maintain a skincare routine that suppresses transepidermal water loss over an extended period. As stratum corneum hydration increased after four weeks, it was determined that stratum corneum condition had improved compared with before the skincare regimen. A comprehensive analysis was then conducted of the expression level of SSL-RNA accompanying this change.

Differentially expressed genes (DEGs) analysis^{*2} revealed that more than 200 genes were upregulated and more than 150 genes were downregulated (Figure 1). This made it possible to capture, in living human skin itself, the broad-ranging changes occurring inside the skin that accompany changes in stratum corneum condition.

^{*2} A method for comparing gene expression levels and identifying differentially expressed genes for subsequent analysis

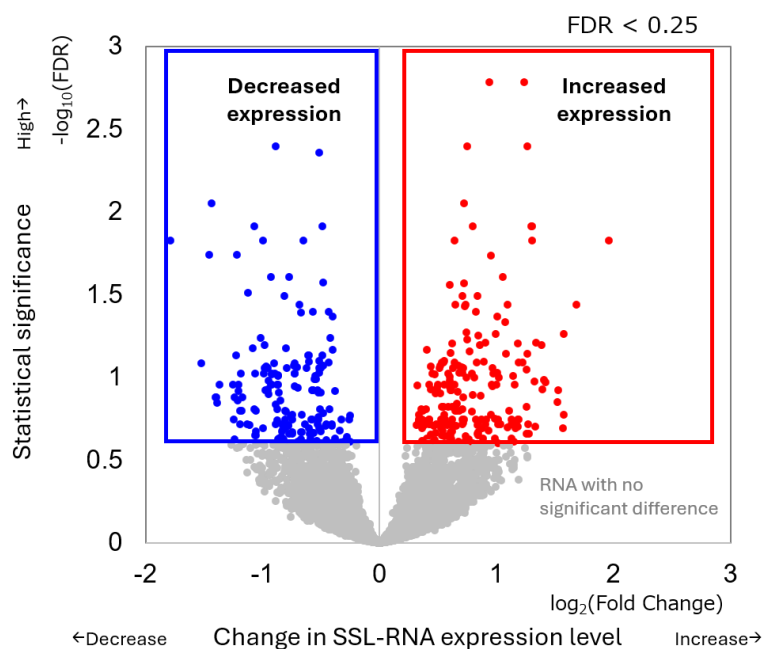


Figure 1. Changes in SSL-RNA expression levels accompanying changes in stratum corneum condition

The significance of the SSL-RNA that changed accompanying improvement in stratum corneum condition

Further detailed analysis revealed that the RNA exhibiting increased expression belonged to RNA groups^{*3} important for regulating cell function and responding to external stimuli and environmental changes. Meanwhile, a tendency was observed for decreased expression of RNA related to barrier function, such as those involved in epidermal formation and lipid metabolism. While this result represents one example of the effects of improved stratum corneum condition, Kao interprets it to indicate that as stratum corneum condition

improved, the excessive activity involved in maintaining the skin barrier was attenuated, and the skin moved in the direction of recovering its inherently healthy state.

*3 Regulation of kinase activity, RNA splicing, response to cytokines

Summary

In this study, changes inside the skin accompanying improvement in stratum corneum condition were analyzed using SSL-RNA monitoring technology, and it was found—in living human skin itself—that when stratum corneum condition improves, not only RNA involved in the stratum corneum but also RNA involved in a variety of biological functions changes dynamically inside the skin. This finding suggests that improvement in stratum corneum condition affects not only the skin surface but also the functions inside the skin.

Kao is advancing the development of various technologies focused on stratum corneum health. By deepening these research efforts going forward, Kao will contribute to the generation of insights that lead to the maintenance of healthy skin.

About Kao

Kao, a Japan-based manufacturer of cosmetics, personal care and household products, as well as specialty chemicals, creates high-value-added products and services that provide care and enrichment for the life of all people and the planet. Through its brands such as *Curél*, *SENSAI*, and *MOLTON BROWN* cosmetics, *Bioré* and *Jergens* skin care products, *Oribe* hair care products, *Attack* laundry detergent, and *Laurier* sanitary products, Kao is part of the everyday lives of people across Asia, the Americas, Europe, the Middle East, and Africa. Combined with its chemical business, which contributes to a wide range of industries, Kao generates about 1,690 billion yen in annual sales. Kao employs about 31,500 people worldwide and has more than 130 years of history in innovation.

Please visit [the Kao Group website](#) for additional information.

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