

## Shiseido successfully predicts future skin concerns by facial images

New “preventive care” technology focusing on nasal skeleton bone structure to be introduced for upcoming inner beauty business

Shiseido has discovered that the nasal skeleton structure is related to such future skin conditions as wrinkles and sagging and the characteristics of internal skin, such as tissues (e.g., capillaries). It has developed a tool for predicting skin conditions including wrinkles, sagging, and internal skin conditions that are likely to appear in the future by analyzing facial images. This technology is based on the unique beauty algorithms\*1 that Shiseido has developed by combining its research findings accumulated over the course of more than 100 years.

This will enable the proposal of preventive care before skin problems appear, while also serving as a promising tool to accelerate the development of new, more personalized approaches, such as proper massage methods and internal body care.

The results of this study were presented in part at the 28th JFACE Annual Conference (Forum Kaogaku 2023) held on October 14–15, 2023. Shiseido plans to use this technology as a measurement tool in its inner beauty business, which will officially be launched in 2024.

\*1 Shiseido, in collaboration with RIKEN, develops novel skin prediction models based on relationships between skin, body, and mind

<https://corp.shiseido.com/jp/news/detail.html?n=00000000003691>

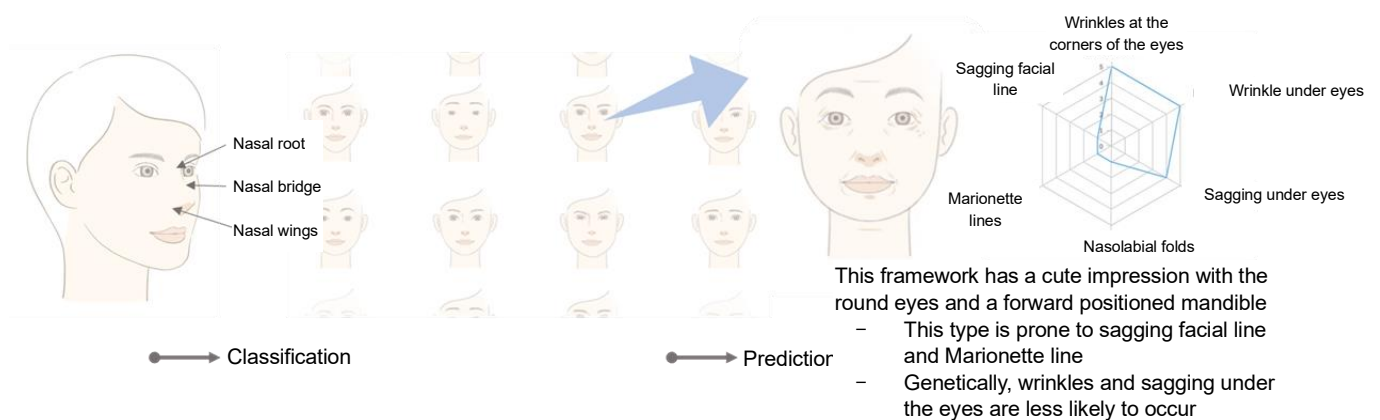


Figure 1. Classification of face types by nasal features and an example of skin problem prediction

### Research background

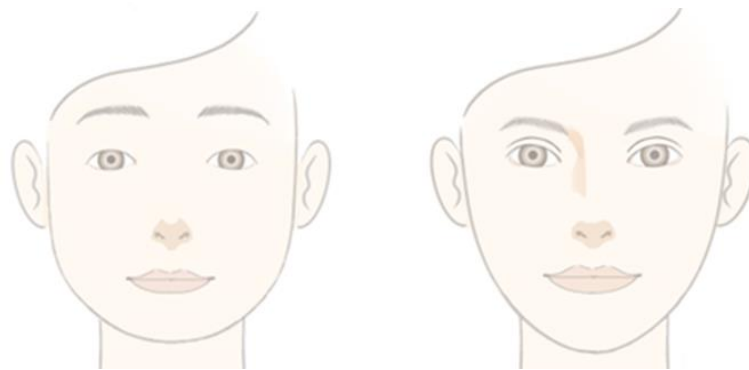
A person's "current" skin condition is thought to be related to the "skin characteristics that each person is born with," combined with the effects of skin care, including UV protection, diet, exercise, sleep, smoking, and other lifestyle habits. Thus far, Shiseido has developed multiple technologies to evaluate a person's current skin condition using facial images and has applied them to at-home self-check apps and in-store devices. Furthermore, based on the idea that an understanding of a person's innate skin properties might lead to the ability to address skin problems before they appear, the present study focused on nasal skeleton structure, which is highly representative of inherent personal characteristics.

### Discovery of relationships between nasal skeleton structure and the conditions and the inside of the skin

For facial shape features, 12 items including the roundness of the eyes, length of the face, size of the lips, height of nasal bridge (nose line), and the roundness of the chin are set. As for the characteristics of skin conditions, 18 items were set as variables including lines at the corners of the eyes and sagging of

the face line. These items were converted to numerical terms based on facial images obtained from 424 Asian women aged 40–59 years and a subjective evaluation by visual observation, then used for analysis. As a result, we found that skin conditions such as wrinkles and sagging skin are strongly related to the features of the nose, in particular, "the root, bridge, and wings of the nose."<sup>2</sup> Moreover, when analyzed and evaluated comprehensively, it was found that "the shape of nasal bridge and saturation of skin color" and "nasal skeleton structure and the condition inside the skin, such as the capillary density" were also related.

\*2 Nasal root: the base of the nose. Nasal bridge: the line of the nose. Nasal wings: the nostrils.



Face type A: A bone structure with a low bridge and large wings of the nose    Face type B: A bone structure with a high bridge and deep root of the nose

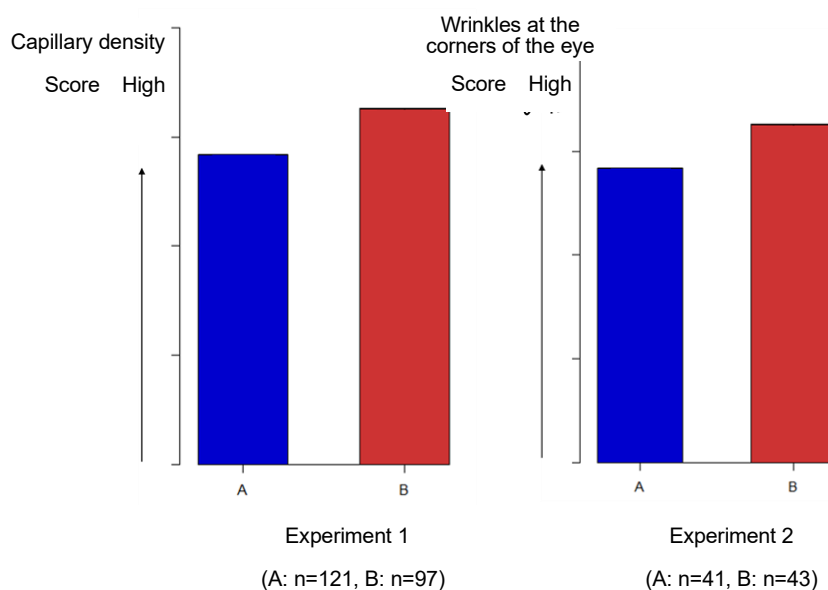


Figure 2: Relationships between nasal skeleton structure and wrinkles or internal skin characteristics

Face type B has a higher wrinkle score than Face type A, and Face type B has a higher capillary density score than Face type A.

### Development of a tool to predict future skin problems from images of the nose taken with a common smartphone

Using the findings of the present study, Shiseido has developed a tool to predict future skin problems and internal skin characteristics from nasal skeleton structure. The challenge in the development lied in capturing the shape of the nose accurately from images obtained with typical smartphones. The eyes and mouth have clear contours relative to the skin, so it is easy to quantitatively detect their shape features. However, the nose, although three-dimensional, is the same color as the skin, and it was thus very difficult to precisely detect its shape and size. Accordingly, the company pushed forward with its study by focusing on the slight shadow of the nose projected on the facial image, and as a result, Shiseido was finally able to develop an image processing technology to make the precise calculation possible. This technology successfully enabled the detection of the features of nasal skeleton structure, including the root, bridge,

and wings of the nose, even with the performance of typical smartphone cameras.

By combining this image analysis technology with the knowledge of relationships between nasal skeleton structure and the conditions and the inside of the skin, the company has classified faces into 16 types and developed a tool that allows it to predict skin problems that are likely to appear in the future and internal skin conditions for each type.

#### Development of the new skin prediction technology and future prospects

With this technology, Shiseido aims to realize prevention-type care to address skin problems before they appear, in addition to improvement-type care to deal with problems that have appeared on the skin. In addition, as a way to address skin problems, it will propose various types of care for the mind and body, not only with cosmetics but also with food, exercise, and sleep, based on the relationships identified in this study and other findings, as the company further accelerates the promotion of its 2030 vision “Personal Beauty Wellness Company.”

#### About Our R&D Strategy:

This study was conducted with the aim of elucidating the relationships between the skin, body, and mind under Future Beauty INNOVATION, one of the three pillars of Shiseido's R&D strategy.

- Integrated Report 2022 (Beauty Innovation)

[https://corp.shiseido.com/report/jp/2022/value\\_creation/innovation](https://corp.shiseido.com/report/jp/2022/value_creation/innovation)

- Keywords

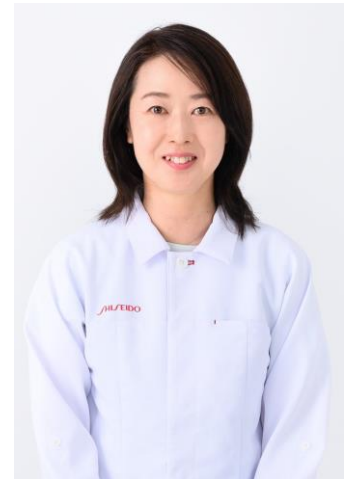
Future Beauty INNOVATION; elucidation of the relationships between the skin, body, and mind

<Reference>

### Researchers' challenges

#### ■R&D Philosophy DYNAMIC HARMONY approach

This research was carried out under the Inside/Outside approach of Shiseido's R&D philosophy, DYNAMIC HARMONY. Focusing on the connection between the skin, body, and mind, Shiseido pursued research with the aim of bringing out inherent healthy beauty from within each customer. In addition, the company tried to create a new value by combining its strengths with the expertise of companies in different industries, which was a bold challenge.



Dr. Noriko Sakao, Manager

#### ■Prevention of skin problems based on innate properties

If you think of the skin in terms of both its innate properties and lifestyle habits, it is possible to not only improve skin problems but also link them to "prevention." With this thought in mind, Shiseido worked on a study to investigate the properties that the skin originally has, which are the foundation of the skin.

In many cases the inherent characteristics of the skin have not been clarified, and it is difficult to think of them separately from the effects of lifestyle habits. Against this backdrop, the company focused its attention to the fact that, the nose, among the various facial organs, starts to form very early in the process of fetal growth, even before the fetal heart starts to beat. We learned that the shape of the nose gradually formed from that time on is affected not only by genetic characteristics but also by the growth environment after birth. Accordingly, Shiseido decided to proceed with its study focusing on the shape of the nose.

From large amounts of skin analysis data accumulated at Shiseido over the course of many years, the company began to see a relationship between the shape of the nose and wrinkles; however, even then, it felt as if it was groping its way forward in the absence of a correct answer, wondering which skin conditions and internal skin characteristics might be related to the nose. Consequently, Shiseido was able to identify a relationship between the shape of the nose and the condition of the capillaries. It has been known that the condition of the capillaries is also related to the firmness and wrinkles of the skin, and so the company believes that the technology it developed for predicting the characteristics inside the skin will lead to proposals for cosmetic behaviors tailored to each person.

#### Shiseido's R&D Philosophy DYNAMIC HARMONY

- Shiseido Formulates Its Unique R&D Philosophy "DYNAMIC HARMONY" (2021)

<https://corp.shiseido.com/jp/news/detail.html?n=00000000003252>

- DYNAMIC HARMONY website:

<https://corp.shiseido.com/jp/rd/dynamicharmony>