

## Press Release

## Research and Development

## Shiseido develops a new technique for improving the age spot-prone environment of the dermis using a combination of high-frequency electrical stimulation (radio frequency) and plant extract

Shiseido succeeded in inhibiting melanin production by combining the use of Panax ginseng root extract with special, complex energy irradiation (special radio frequency [RF] irradiation), which is based on high-frequency electrical stimulation at a uniquely set frequency. This technique helps improve the age spot-prone environment of the dermis by suppressing the emergence of senescent fibroblasts<sup>\*1</sup>, known as one of the causes of age spots, and further, by promoting the proliferation of normal fibroblasts to produce a proper balance between the normal and senescent cells. In the area of physical energy stimulation (including RF), which produces effects with a gentler force than cosmetic medicine, this is the first approach addressing improvement of age spots through dermal fibroblasts.

The results of this study will be presented in part at the 33rd International Federation of Societies of Cosmetic Chemists (IFSCC) Congress in Barcelona 2023 (Sept., 4-7, 2023).

\*1 Fibroblasts: Cells that produce components of the dermis, such as collagen, hyaluronic acid, and elastin, and contributes to the formation of connective tissue.

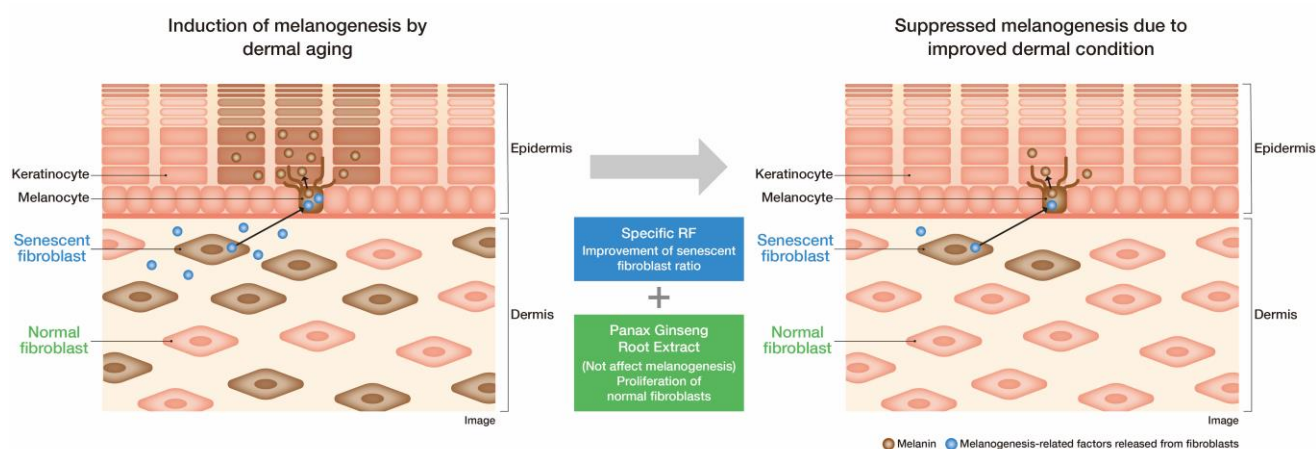


Figure 1. Mechanism for improving the environment of the dermis by combining special RF irradiation with the Panax ginseng root extract (image)

## Research background

Although senescent fibroblasts have been known as a cause of age spots in the dermis, improving the environment of the dermis to a satisfactory extent without imposing a burden on the skin has generally been considered difficult, with the main approach so far being cosmetic medicine. At Shiseido, years of research efforts aimed at improving age spots, a skin concern shared by many customers, have led us to focus on the fact that RF, a type of physical energy stimuli that can be applied to home beauty equipment, exerts its action even on the dermis. Therefore, this time, we searched for a new approach to improve the age spot-prone skin environment of the dermis using special RF set uniquely to produce a gentler force than cosmetic medicine.

**The effect of special RF on reducing the proportion of senescent cells, and its combined effect with Panax ginseng root extract**

In the dermis of the skin with age spots, senescent fibroblasts are found in large numbers; these cells have been shown to promote melanin production with the accumulation of ultraviolet (UV) damage. In the present study, we confirmed that the amount of senescent fibroblasts resulting from UV rays can be reduced by irradiating the senescent fibroblasts with special RF. Moreover, when the Panax ginseng root extract was added, the ratio of senescent fibroblasts in the entire fibroblasts was further reduced, showing improvement in the environment of the dermis (Figure 2).

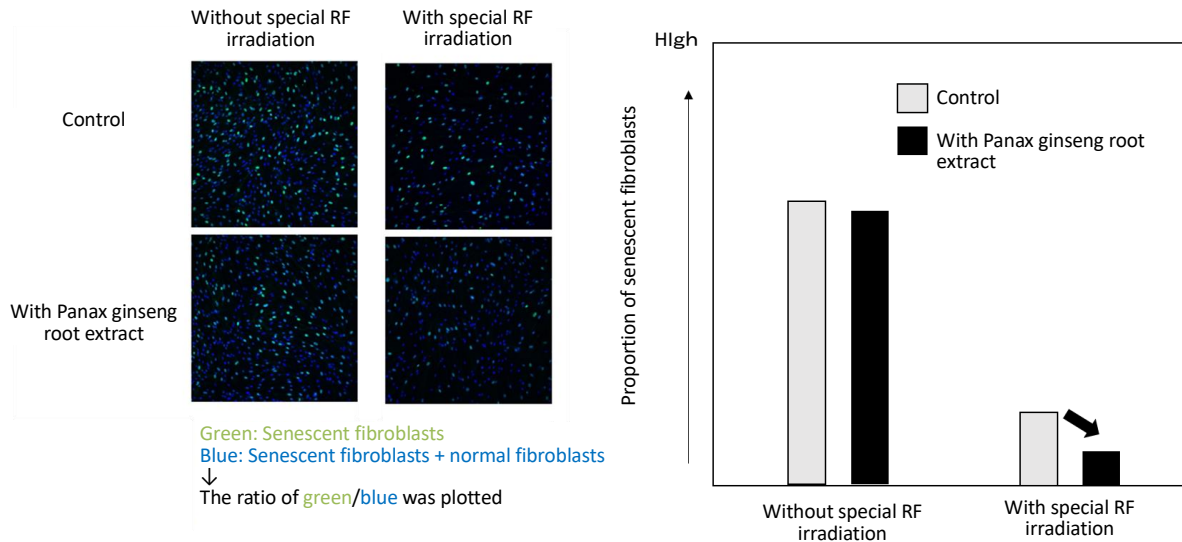


Figure 2. Effects of special RF irradiation and addition of the Panax ginseng root extract on senescent fibroblasts

**The effect of special RF on inhibiting melanin production, and its combined effect with Panax ginseng root extract**

By combining senescent fibroblasts subjected to special RF irradiation plus Panax ginseng root extract and 3D epidermal model, we confirmed the effects of each on melanin production due to UV irradiation. When senescent cells were irradiated with special RF, melanin production in the 3D epidermal model was significantly suppressed. Although no inhibitory effect on melanin production was observed with the Panax ginseng root extract alone, when combined with special RF, a significant melanin production inhibition was observed relative to special RF alone (Figure 3). In the present study, we also found that the balance between normal fibroblasts and senescent fibroblasts is important in improving age spots, given that the amount of melanin was significantly reduced when the change in the proportion of senescent fibroblasts was observed.

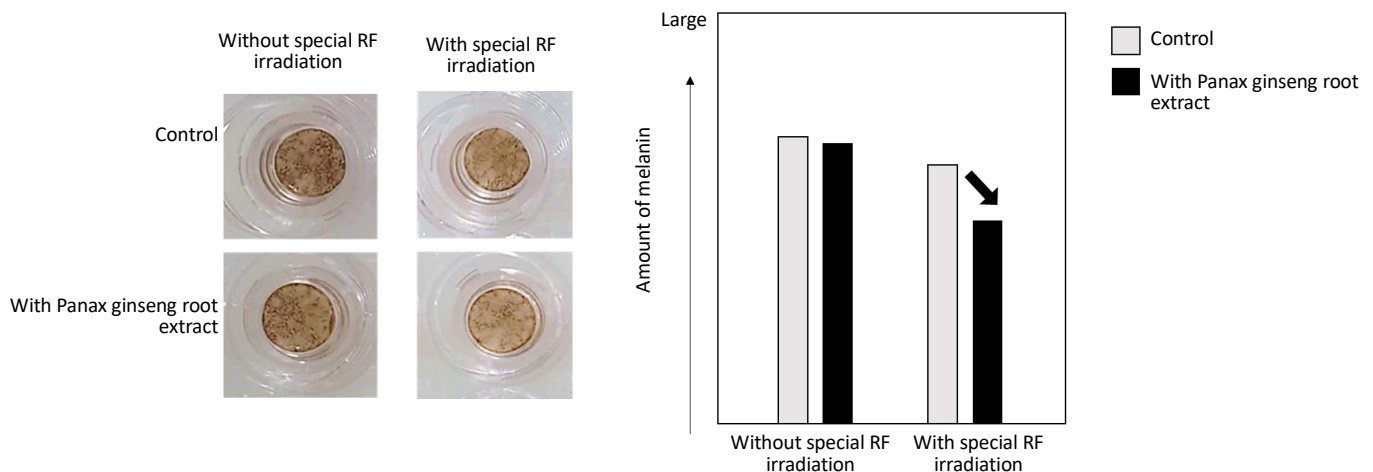


Figure 3. Effects of special RF irradiation and addition of the Panax ginseng root extract on melanin production

## Future prospects

Shiseido has been leading research on age spots for many years, aiming to solve the fundamental problems of age spots and dullness. This includes the analysis of the skin conditions unique to age spots to elucidate the various factors contributing to age spot formation. In the present study, we discovered that the combination of special RF and a plant extract works on both normal fibroblasts and senescent fibroblasts that create the skin environment susceptible to dark spot formation, thereby improving the age spot-prone skin environment of the dermis and inhibiting melanin production. Toward realizing the vision stated in the management strategy, "Personal Skin Beauty & Wellness Company," Shiseido will continue to take on a challenge to promote beauty innovation beyond conventional cosmetics to bring out the original beauty of each and every customer.

About our R&D strategy:

This study has been promoted under "Skin Beauty INNOVATION," one of the three pillars of Shiseido's R&D strategy, with the aim of developing new solutions for permanent skin concerns, such as age spots, dullness, wrinkles, sagging, and pores, which have been troubling our customers for many years.

- Integrated Report 2022 (Beauty Innovation Part)

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

- Keywords

Skin Beauty INNOVATION, eternal skin concerns, age spots and dullness, beauty devices

<Reference>

### Researchers' challenges

#### ■ Challenge to develop a new solution for age spot improvement

The present study was carried out with the Inside/Outside approach under Shiseido's unique R&D philosophy, "DYNAMIC HARMONY," with the aim of bringing out the skin's original radiance by preventing and improving age not only on the surface of the skin but also from the deep parts of the skin.

#### ■ Passion for research

Since it is not possible to solve skin concerns by simply exploring the phenomena occurring around age spots, it is our major mission to develop solutions that correspond to the phenomena and deliver them to our customers. For the first time in this study, special RF was combined with the Panax ginseng root extract, and this achieved high efficacy by exerting effects on both healthy cells in the deep parts of the skin and cells that have accumulated many years of damage. We will continue to advance our research in order to deliver new solutions to improve age spots in the future.



Dr. Saaya Koike, researcher

Shiseido's R&D Philosophy "DYNAMIC HARMONY"

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

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

DYNAMIC HARMONY website:

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