News Release

MILBON

KOSÉ

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# Discovery that Enmei Herb Extract Suppresses Skin Inflammation Caused by the Resident Skin Bacteria Enterococcus

Milbon Co., Ltd. (head office: Chuo-ku, Tokyo, President and CEO: Hidenori Sakashita), a manufacturer of salon-exclusive haircare products and cosmetics, in collaboration with KOSÉ Corporation (head office: Chuo-ku, Tokyo, President and CEO: Kazutoshi Kobayashi), has confirmed that Enterococcus bacteria, one of the resident skin bacteria, cause skin inflammation.

In addition, it has found that an extract of the traditional Asian medicinal herb, Enmei herb[*1], can suppress this inflammation.

## [Research Background]

Multiple species of resident bacteria live in symbiosis on human skin, and their balance is also related to the skin condition. For example, it is known that the people with atopic dermatitis have an imbalanced proportion of certain bacteria, indicating a close symbiotic relationship between the skin and bacteria. For this reason, in recent years, there has been an increased focus on bacterial flora research investigating the relationship between the skin and bacteria.

Milbon has analyzed the bacterial flora and the condition of the scalp and hair of Japanese women and found that those with a higher proportion of Enterococcus—bacteria mainly found in the intestines—have a stiffer scalp and more pronounced hair waviness. Since scalp stiffness and hair waviness are correlated with aging [Discovery of Bacteria (Aging Bacteria™) that Promote Aging of Scalp and Hair (News Release, June 25, 2019)], Milbon has named Enterococcus bacteria "Aging Bacteria™" due to their close association with scalp and hair aging, and has been conducting its research.

Enterococcus bacteria are also known as resident facial skin bacteria, but their presence in low proportions has not received much attention. Therefore, in this research, we investigated the effects of Enterococcus bacteria—associated with scalp aging— on facial skin condition. This is an attempt to gain new insights through a collaboration between Milbon, which specializes in scalp and hair research, and KOSÉ Corporation, which specializes in facial skin research.

## [Study Findings]

### 1. Enterococcus bacteria cause skin inflammation

To investigate the relationship between Enterococcus bacteria and facial skin conditions, 220 Japanese women in their 20s to 70s were divided into two groups—those with and those without

the bacteria on their faces— to compare differences in skin conditions such as moisture content, sebum content, dark spot scores, and wrinkle scores, etc. The results confirmed that individuals with Enterococcus bacteria had higher under-eye wrinkle scores and nose oiliness scores, indicating notable differences in skin conditions.

To explore the causes of this, epidermal cells were cultured with Enterococcus bacteria to investigate the viability of the epidermal cells and identify the gene expression changes. The results confirmed that Enterococcus bacteria caused a decrease in epidermal cell viability (Figure 1). This phenomenon does not occur with Staphylococcus epidermidis, a major resident skin bacterium, and is thought to be caused by the Enterococcus bacteria. In addition, when we tested culture supernatants containing metabolites produced by the bacteria, as well as dead bacteria, we found that cell viability was not reduced, suggesting that the decrease in epidermal cell viability was due to the action of live Enterococcus bacteria.

Further investigation of gene expression changes in epidermal cells when Enterococcus bacteria were present indicated an increased expression of genes such as the IL-1α and TNF-α genes encoding proteins involved in the development of inflammation (Figure 2). This demonstrates that live Enterococcus bacteria can cause skin inflammation. Inflammation is thought to be one of the factors accelerating aging, and those carrying Enterococcus bacteria may be more prone to wrinkles and other signs of aging as a result of chronic inflammatory responses in the skin.

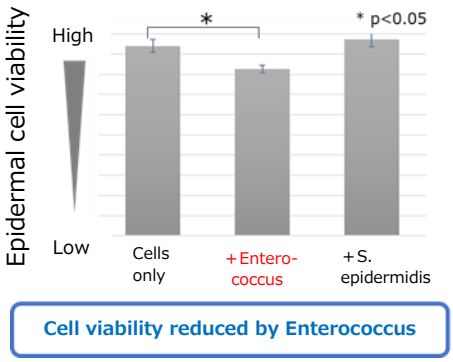


Figure 1
Relationship between Enterococcus bacteria and epidermal cell viability

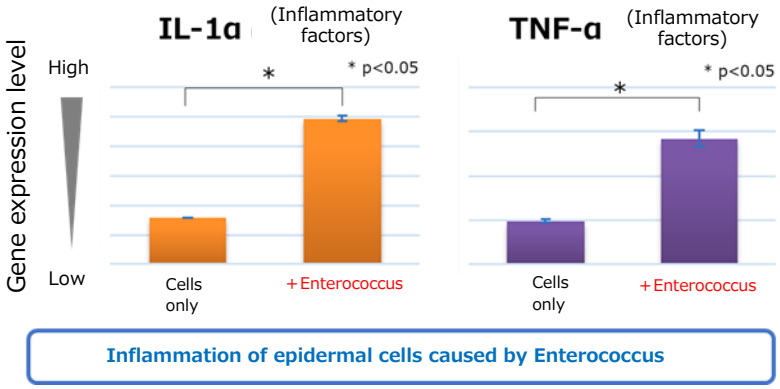


Figure 2
Relationship between Enterococcus bacteria and inflammatory factors

**2. Enmei herb extract inhibits skin inflammation caused by Enterococcus bacteria**

Next, we searched for cosmetic ingredients that can suppress this skin inflammation. We focused on Enmei herb extract due to its high antioxidant effect and historical use as an herbal medicine. When epidermal cells were co-cultured with Enterococcus bacteria and treated with Enmei herb extract, we confirmed that the expression of inflammation-related genes, such as IL-1α and TNF-α was inhibited (Figure 3).

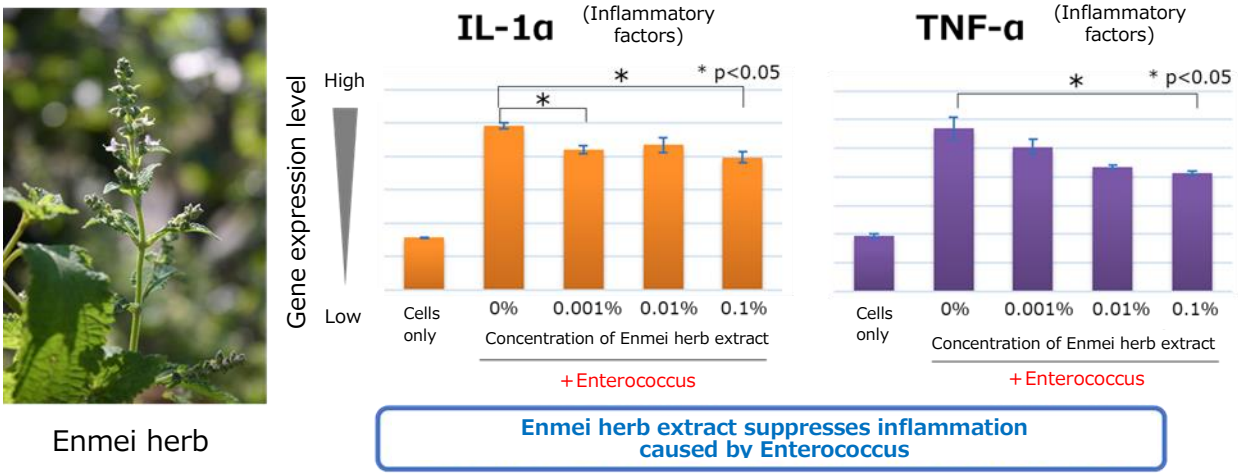


Figure 3 Effects of Enmei herb extract on suppression of skin inflammation

**[Future Vision]**

From this research, we found that Enterococcus bacteria, one of the resident bacteria, can induce facial skin inflammation and that Enmei herb extract suppresses that inflammation. As skin inflammation is one of the factors accelerating aging, we believe that these results can contribute to age-related care. We will apply these results to the development of skincare products and services in the future.

These research findings were made possible by focusing on the relationship between the scalp and face and are the result of collaboration between Milbon and KOSÉ, both of which have strengths in different fields. We aim to create new value for our customers by continuing to combine our expertise.

**«Terminology»**

*1 Enmei herb

A perennial herb of the Perilla family, also known as “hikiokoshi.” It is known as an herbal medicine, with an anecdote that it has the “power to revive someone who has fainted.”

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