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Successful Development of Hair Color Stimulation Suppression Technology

Through Use of Reconstructed Epidermal Skin Model.

~Establishment of Technology to Quantify Hair Color Stimulation ~

The Milbon Co., Ltd. (President and CEO: Ryuji Sato) has successfully developed hair color stimulation suppression technology through the use of reconstructed epidermal skin models*1. Reconstructed epidermal skin models are artificially cultured skin involving epidermal cells cultured as a sheet, and they were used to quantify the damage caused to the reconstructed epidermal skin models and provide an accurate evaluation of that stimulation. The resulting hair color stimulation suppression technology is intended to be used in forthcoming hair color products.

The results of this research were partially announced at the 18th Scientific Meeting of the Japanese Society of Anti-Aging Medicine.

[External Release]

Released At: 18th Scientific Meeting of the Japanese Society of Anti-Aging Medicine

Release Title: Evaluation of Skin Stimulation of Hair Dye for Grey Hair Using Reconstructed Epidermal Skin Models

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[Research Background]

Hair coloring is enjoyed by many women, irrespective of age, and there are also many women who specifically go to a beauty salon for hair coloring. However, there are also women who experience stimulation of the scalp when having their hair colored, and this can lead to them extending the length of the cycle of hair coloring or giving up on hair color altogether.

It can also be predicted that the number of women worried about the stimulation caused by hair coloring will increase as the greying of society in Japan continues, as older age creates more cases of people dyeing their grey hair. In order to resolve this and allow people to enjoy hair coloring without any concerns, our research team conducted research into hair color and control of scalp stimulation.

In order to develop hair color stimulation suppression technology, it is necessary to accurately evaluate the stimulation caused by hair color. One method of doing this is to conduct a questionnaire survey about the stimulation felt during hair coloring. However, as hair coloring cannot be performed in succession, a certain period of time would need to be waited before continuing the evaluation in order to perform a comparative analysis. This may lead to changes in the way the stimulation is felt, due to factors such as physical changes or the weather, or make it difficult to detect trace differences in stimulation due to the intervening gap, which in turn would have made it difficult to accurately and quickly perform an evaluation. Therefore, our search continued for a replacement method to evaluate the stimulation.



[Research Results]

~ Discovery of Skin Regeneration Models ~

As research into a method for evaluating stimulation continued, the research team turned their attention to “Reconstructed epidermal skin models,” developed using skin regeneration medical technology.

Reconstructed epidermal skin models are artificially cultured skin involving epidermal cells cultured as a sheet. Reconstructed epidermal skin models are already used for such tasks as evaluating the stimulation of newly synthesized chemical substances, and we had the idea that perhaps they can be used to evaluate the stimulation caused by hair color. Aligning the actual stimulation that people feel during hair coloring and the evaluation results from the reconstructed epidermal skin models meant that all of the details of the experimental method had to be optimized, including the length of time the hair color agent and reconstructed epidermal skin models are in contact and the volume used. The research team spent around two years of research optimizing the experimental methods, and as a result successfully achieved quantification of the stimulation felt during hair coloring.

~ The Resulting Hair Color Stimulation Suppression Technology ~

Using the evaluation technology making use of reconstructed epidermal skin models, the research team discovered that meadowfoam oil *2 and apricot oil *3 are effective in suppressing the stimulation of hair color. Conversely, this system also allows the ingredients that make the stimulation stronger to be identified, and by removing these while carefully selecting those that are effective, helped to rapidly increase the speed of the research. The knowledge obtained from this research will be applied to hair color products in the future.

Milbon will continue further research, aiming to realize gentle hair color that will allow more women to continue to enjoy coloring their hair.



Reference Materials

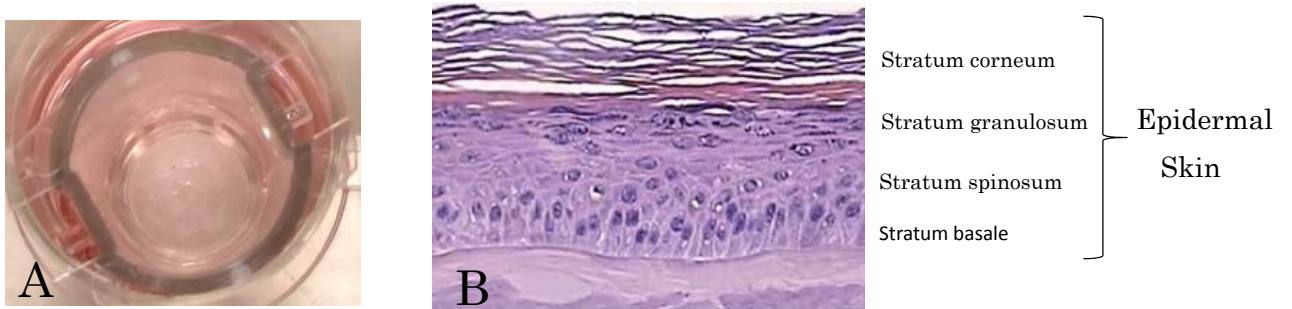


Fig. 1 Reconstructed epidermal skin models (A) and Cross Section structure (B)

A: A special cultivation container 1cm in diameter with a cultivated sheet of skin having composition of the skin's surface.

B: When a cross section of the Reconstructed epidermal skin model is examined, it can be seen that the four layers that comprise the epidermal skin have been recreated.

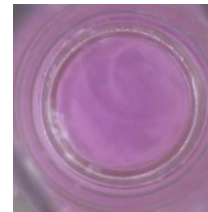
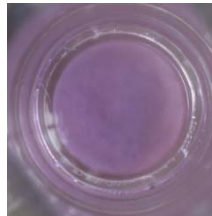
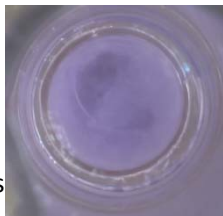
Hair color agent scalp stimulation level

High

Medium

Low

Evaluation using a Reconstructed epidermal skin models



Blue: High damage

Pink: Low damage

Fig. 2 Examples of Evaluation of Hair Color Agent Using a Reconstructed epidermal skin model

For a hair color agent for which the scalp stimulation level was already known, a reconstructed epidermal skin model was used, and the damage received by the evaluation reconstructed epidermal skin model turned into a color, creating an evaluation method that matches the damage and the stimulation level of the scalp.

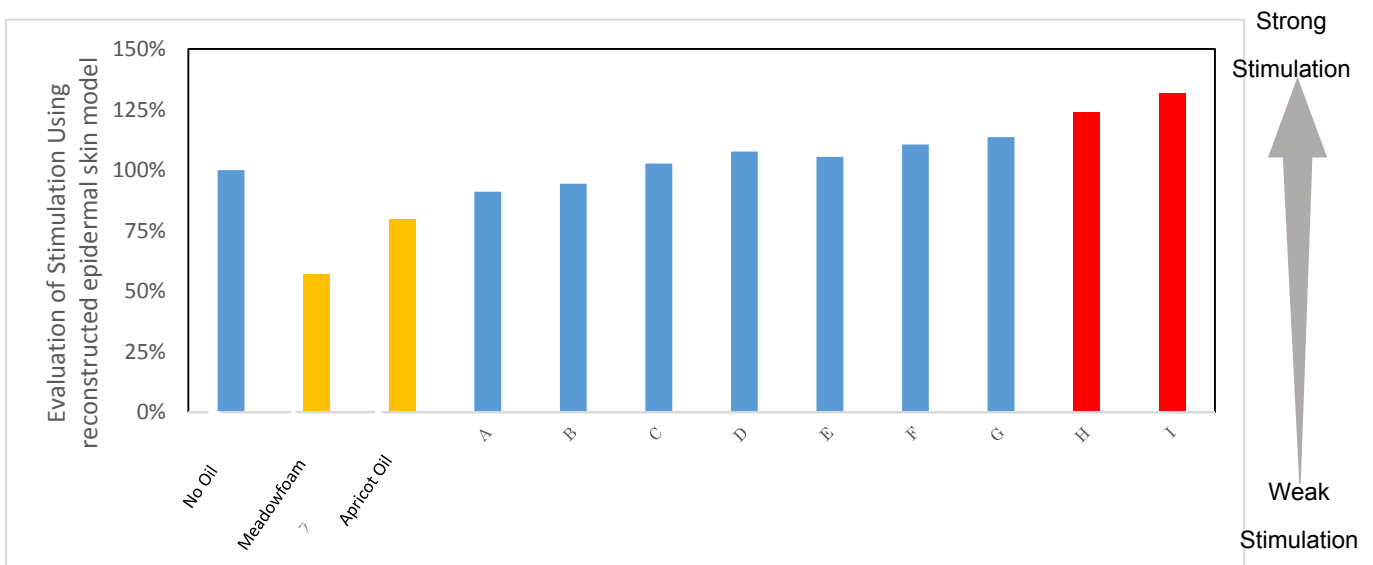


Fig. 3 Evaluation Results for Stimulation Suppression Effect of Plant Oils Using a Reconstructed Epidermal Skin Model

Hair color agent formulated without any oil was then formulated with one of 11 types of plant oil, and a stimulation suppression effect evaluation performed using a reconstructed epidermal skin model. The results not only revealed the stimulation suppression effect of meadowfoam oil and apricot oil, but also that plant oils like H and I can negatively heighten the stimulation.

*1 Reconstructed epidermal skin model: Artificially cultured skin involving epidermal cells cultured as a sheet. This technology was created for transplant surgery to severely damaged areas of the skin, such as due to burns, but it is also used when evaluating the safety of chemical substances on the skin.

*2 Meadowfoam oil: Oil extracted from meadowfoam seeds, which are mainly grown in American pastureland and bloom with white flowers.

*3 Apricot oil: Oil extracted from apricot kernels. As well for cosmetics products, it is also used as a cooking oil.

■For inquiries relating to this press release

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