

Field: Life science and medicine; Keywords: sweat gland, live imaging, heat stroke, hyperhidrosis, antiperspirant

Researcher in Joint Research Group Led by Osaka University Wins Academic Prize at **Cosmetic Victories 2019**

First in Japan to Receive the Award

-Proposing New Concept for Next-Generation Antiperspirants-

[Gist of the research results]

- ◆ Kie Nakashima, a Specially Appointed Researcher at Laboratory of Advanced Cosmetic Science, Graduate School of Pharmaceutical Sciences, Osaka University*¹, has won the Academic Prize at the Cosmetics Victories 2019 sponsored by Cosmetic Valley in France*², the world's largest cluster in the cosmetics industry. In the contest, contestants competed on the state-of-the-art cosmetics technologies.
- ◆ In the research, an imaging system of contracting motility of human sweat glands in sweating was established. The system clarified contracting motility of sweat glands in sweating and was applied to evaluate active ingredients that suppress sweating.
- ◆ The imaging system of motility of sweat gland resolves problems caused when the exit of sweat gland is plugged by using a conventional antiperspirant (excessive sweating that cannot be suppressed, skin inflammation, yellowing of the clothes caused by active ingredients, etc.). It is also expected to be applied to next-generation antiperspirants that directly act on the secretory part of sweat glands.

❖ Overview

The joint research group*³, led by Guest Professor Fumihiko Okada, Laboratory of Advanced Cosmetic Science, Graduate School of Pharmaceutical Sciences, Osaka University, conducts research for the development of next-generation antiperspirants. This time, the group clarified the temporal change in sweat gland contraction in a three-dimensional (3D) structure using a 3D live imaging system (to observe the motility in 3D). As an application of this imaging system, Kie Nakashima, a Specially Appointed Researcher of



Fig.1: Award Ceremony of Cosmetic Victories 2019
Photo by Cécile MUZARD

the group presented a new concept of new antiperspirants to suppress sweating by making sweat glands inactive, not by plugging the exit of sweat glands as conventional antiperspirants do. The concept was highly evaluated and won the Academic Prize at the Cosmetic Victories 2019 contest (held at 17:00, June 6, 2019 local time and 0:00 on June 7, 2019, Japan time) sponsored by Cosmetic Valley of France, the world's largest cluster of the cosmetics industry.

❖ Background of the research

With the progress of global warming and super-aging society, an increase in people suffering hyperhidrosis or heat stroke has become a social issue. To improve failure of sweating function, it is necessary to understand the structure of sweat glands that contract in sweating. A sweat gland is a

single tubular exocrine gland consisting of a secretory part and an excretory part. Sweat secreted at the secretory part is excreted to the skin surface through the excretory part. The secretory part at the end of the sweat gland and a part of the excretory part are complicatedly folded in coiled structure like thread waste entanglement*4. The outermost layer of the secretory part in this coiled area is surrounded by myoepithelial cells and contracts in sweating. However, **due to the complex structure of sweat glands, the mechanism of sweat glands had not been clarified with conventional analysis methods. The group has found sweat gland stem cells of humans and successfully reproduced a sweat gland-like structure *in vitro*, and visualized the three-dimensional structure of sweat glands.**

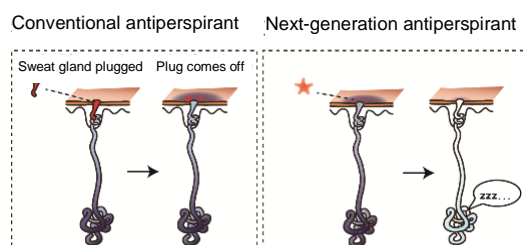


Fig. 2: Concept of next-generation antiperspirant

❖ Social impact of these research results (significance of these research results)

If a next-generation antiperspirant that inhibits sweat gland contraction making use of this award-winning new concept is developed, it is expected to resolve problems that conventional antiperspirants have and greatly contribute to reduce hyperhidrosis and sweat odor, which are troubling today's consumers. Mandom Corporation will work to commercialize a next-generation antiperspirant that inhibits sweating using this evaluation method.

❖ Remarks

This research project was conducted with Grants-in-Aid for Scientific Research of the Japan Society for the Promotion of Science for 17K16337 and 19K177710.

❖ Glossaries

*1 Laboratory of Advanced Cosmetic Science, Graduate School of Pharmaceutical Sciences, Osaka University

Jointly set up in June 2015 by Graduate School of Pharmaceutical Sciences, Osaka University, and Mandom Corporation. This laboratory accepts financial support from private enterprises and aims to produce excellent research results on common themes in

joint research conducted on equal footing. This laboratory is an independent research organization set up within Osaka University and conducts flexible and speedy research activities through discussions between Osaka University and Mandom.

*2 Cosmetic Valley (France)

The world's largest cluster in the fragrance and cosmetics industry in France. Since 2015, it has hosted annual Cosmetic Victories contest as part of its support for research projects on health and beauty. In the contest, "Academic Prize" for researchers and the "Industry Prize" for business people are given. The awardees receive prize of €10,000.

*3 Joint research group

This research was conducted by a group consisting of Professor Kiyotoshi Sekiguchi at Division of Matrixome Research and Application, Institute for Protein Research, Osaka University, Professor Hiroyuki Murota at Department of Dermatology, Graduate School of Biomedical Sciences of Nagasaki University (at Dermatology Department of Integrated Medicine, Graduate School of Medicine, Osaka University during the research period), and the Dermatology Department of Integrated Medicine, Graduate School of Medicine, Osaka University.

*4 Coiled structure of a sweat gland

A sweat gland is a single tubular exocrine gland, and the end part of a sweat gland is folded intricately in coiled structure like thread waste entanglement. The outmost layer of the secretory part in this coiled area is surrounded by myoepithelial cells and contracts in sweating.

❖ Inquiries

<About the research contents>

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