

Mandom Finds Way to Confirm Armpit Perspiration Behavior Associated with Daily Life

- Amount of armpit sweat greatly changes according to behavior & increases more after (rather than during) walking -

Mandom Corporation (Head Office: Osaka City; President Executive Officer & Director: Motonobu Nishimura; hereinafter referred to as “Mandom”) is researching and developing basic technology for creating next-generation antiperspirants to help control sweat.

In order to develop antiperspirants and functional ingredients that are highly effective at controlling sweat, there is a need to both continuously and quantitatively grasp perspiration behavior in daily life. This is particularly important when understanding armpit perspiration behavior, as it is an area that many people worry about in their daily lives. However, up until now, there have not been any evaluation methods capable of both continuously and quantitatively assessing this part of the human body. Now, Mandom has established a method of measurement that solves these issues by developing an original ventilation capsule that is exceptionally capable of adhering closely to human skin while still remaining comfortable. As a result, the company has found out that the amount of armpit sweat greatly changes according to behavior and increases more after walking (rather than during walking), and has also discovered a possible means for suppressing excessive perspiration simply by wiping the arms and neck with a body wipe.

Mandom is also working to develop functional ingredients that suppress sweat gland contraction. Utilizing the method Mandom established for measuring armpit perspiration both continuously and quantitatively in research and development will help the company develop next-generation antiperspirants that are highly effective at controlling sweat, and this is expected to be of great help for improving excessive sweating and the smell of sweat—two worries that many modern consumers have.

Mandom has announced the results of this research (online) at the 31st International Federation of Societies of Cosmetic Chemists (IFSCC) Congress Yokohama event, which was held in 2020 from Wednesday, October 21 to Friday, October 30.

1. The need to both continuously and quantitatively measure armpit perspiration **- Challenges in conventional sweat measurement technology -**

Perspiration is said to play many important roles from the perspective of immunity and body temperature regulation. However, excessive armpit perspiration causes body odor and soils clothing through sweat stains, etc., and against the backdrop of changes in social environments and global warming in recent years, it is a concern that more and more consumers are worrying about. In order to resolve this concern, Mandom has been working to create not only an antiperspirant that covers sweat gland pores with antiperspirant ingredients, but also create a next-generation antiperspirant that acts directly on sweat gland secretions. The two following points are important for realizing an antiperspirant that does a better job of satisfying consumers' needs:

- ① Knowing perspiration behavior (how much people perspire in what kinds of circumstances, etc.)
- ② Being able to confirm the antiperspirant effects of developed products in situations when you want to suppress sweating,

and knowing that conventional measurement methods were unable to continuously and quantitatively measure the amount of sweat perspired during daily activities.

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2. Visualizing sweat behavior associated with daily life using a ventilation capsule originally developed by Mandom

- Amount of armpit sweat greatly changes according to behavior & increases more after (rather than during) walking -

On this occasion, in order to understand sweat behavior, Mandom employed a perspiration volume evaluation method using the ventilation capsule it originally developed and confirmed armpit sweat behavior associated with summer activities (changing locations from home to work, working at the office and having lunch in an approximately 35°C environment). During the evaluation, subjects who sweat a lot perspired more after they left their homes while they were changing locations outside. The evaluation also showed that after these subjects got to work, the amount of sweat they perspired became less as they worked in an air-conditioned environment, and that their sweat behavior changed greatly according to their actions (see Figure 1). In addition, after walking outside, the evaluation showed that these subjects generated more armpit sweat after they finished their walk (rather than during) (see Figure 2).

On the other hand, there were also subjects who do not sweat a lot. This evaluation showed that the amount of perspiration generated in subjects who sweat a lot was 35 times more than subjects who do not sweat a lot.

3. Wiping your arms & neck with a body wipe might be able to suppress armpit sweat induced by exercise

It was also confirmed that wiping your body with a body wipe (commercial products that contain menthol) after exercise affects armpit perspiration. As a result, the sweat induced by exercise was quickly reduced by wiping parts of the body other than the armpits (neck, arms, etc.) after completing an exercise (see Figure 3). In other words, it was discovered that simply wiping your arms and neck with a body wipe might be able to suppress excessive armpit perspiration even during daily scenarios when it is difficult to apply an antiperspirant to the armpits.

4. Establishing an original method for measuring amounts of armpit perspiration that can withstand armpit movements during daily activities for the purpose of understanding consumers' perspiration behavior

The aforementioned evaluation was made possible thanks to the original perspiration evaluation method that Mandom established. Out of the perspiration evaluation methods that have existed until now, the ventilation capsule method was an effective method for obtaining quantitative data. This method calculates the amount of sweat generated by sending gas (air or nitrogen) to the ventilation capsule that has been adhered to the area being measured, then calculating the difference between the humidity of the gas flowing into the capsule and the humidity of the gas flowing out of the capsule. It is a method that is suitable for measuring areas where there is little skin stretching or curvatures, such as the forearms. However, this method was not suitable for measuring areas like the armpits since the skin on this part of the body bends and stretches throughout the day. To address this issue, Mandom used a 3D printer to create multiple different shapes for the capsule that adheres to the skin, and derived the three following points as the shape that adheres best but causes little discomfort even while adhered to the armpit during everyday activities (see Figure 4):

- ① Adhesion area with skin is 200 mm² to 600 mm²
- ② Maintains a thickness of under 1 cm and allows for ventilation
- ③ Rounded with no corners

(Capsule shape is patent pending)

Using the forearm, it was confirmed that the amount of perspiration can be measured in the same way as the conventional ventilation capsule method, and so the company established this as a new method for measuring amounts of perspiration (see Figure 5).

In the future, Mandom plans to use the evaluation method it established on this occasion to collect new knowledge regarding perspiration. In addition, the company will combine this with the results* from the Advanced Cosmetic Science Joint Research Program (a joint research program being carried out by Mandom and Osaka University's Graduate School and School of Pharmaceutical Sciences) to help create highly effective next-generation antiperspirants that consumers can really feel.

*Reference News Releases

•“Successful generation of immortalized human eccrine sweat gland myoepithelial cells”(May 8, 2020)

https://www.mandom.co.jp/en/release/pdf/2020050802_en.pdf

•“Mandom Succeeds in Establishing an Evaluation Method for Thermoregulatory Sweat Glands by Visualizing and Quantifying Perspiratory Contractions”(September 18, 2018)

https://www.mandom.co.jp/en/release/pdf/2018091801_en.pdf

•“Successful Visualization of the Three-dimensional Structure of the Sweat Gland, which Regulates Body Temperature”(June 21, 2017)

https://www.mandom.co.jp/en/release/pdf/2017062101_en.pdf

[Reference Material]

Figure 1 Armpit perspiration behavior in subjects who sweat a lot

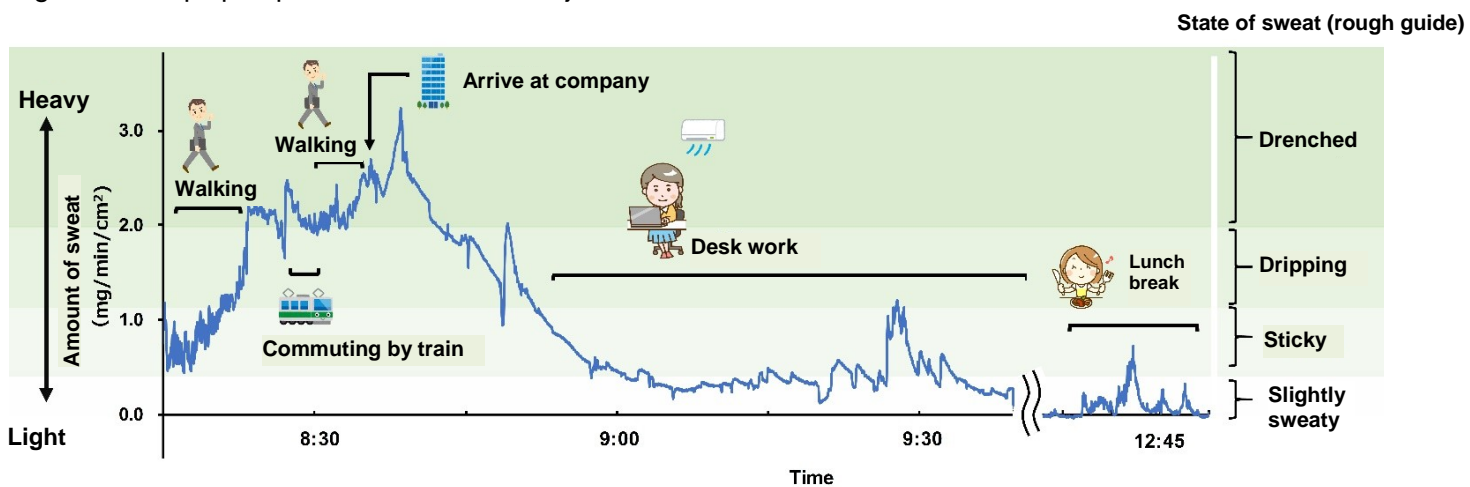


Figure 2 Comparisons of amount of armpit perspiration before and after exercise (walking)

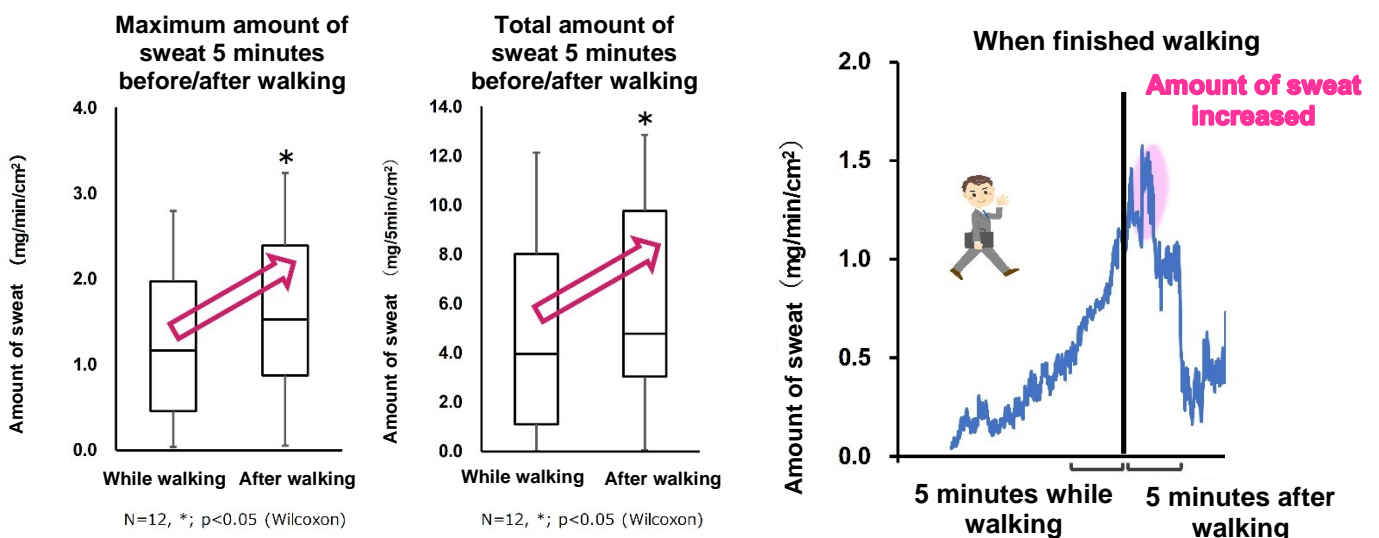


Figure 3 Changes in the amount of armpit perspiration when subjects used a body wipe on areas other than the armpits (arms, neck, etc.)

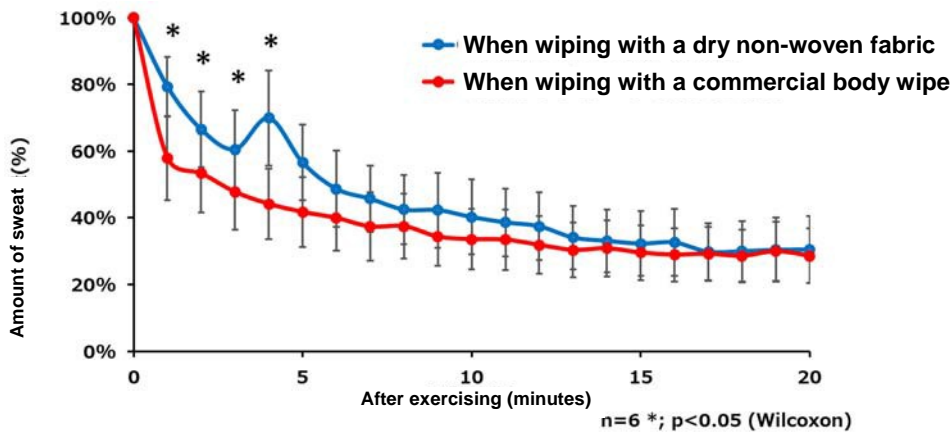


Figure 4 Difference between the shape of the capsule developed by Mandom and the shape of the conventional capsule.

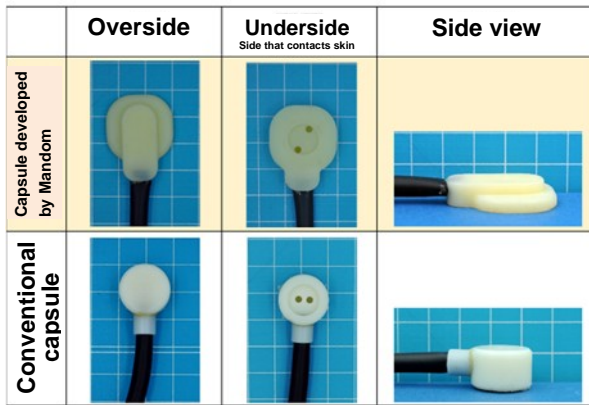


Figure 5 Evaluation equipment suitable for measuring armpit perspiration during daily activities.

