

## Mandom's Research on Axillary Odor of Modern Japanese Men

What are Public Attitudes toward the Topic, and What is the State of This Issue?

Mandom Corporation (Headquarters: Osaka; President Executive Officer: Motonobu Nishimura; hereafter, Mandom) has been involved in developing men's body care products under its flagship brand Gatsby. As a part of that research, we conducted a series of surveys on body odor among teenaged to 60-year-old Japanese men, as well as a sensory evaluation of axillary odor. We intend to present our findings at the 20<sup>th</sup> Annual Conference on Odor Environment held on June 7-8, 2007.

### [Research Background]

Changes in the lifestyles of modern Japanese men have accelerated changes in stylistic awareness and hygienic practices. Japanese men grow more conscious of body odor every year. Research from various aspects has been conducted till date, but investigation on aspects such as the awareness of axillary odor, strength of odor, and types of smell remain insufficient. In addition, the recent changes in lifestyle, eating habits, and external environment, as well as those associated with aging, have been accompanied by changes in attitudes toward body odor and changes in odors themselves. Thus, we conducted a series of surveys by using 600 Japanese men in their teens to their 60s as subjects. We also directly performed a sensory evaluation of the axillary odor of 118 Japanese men to analyze the differences in the strength and categorization of odor types in terms of age. We intend to apply the results of our research to a new series of deodorant products beginning with Gatsby Biocore Deodorant Spray, slated to launch this spring, as well as to novel deodorant formulations currently under development.

### [Survey Methodology]

#### 1. Attitude Surveys on Body Odor

Survey subjects: 600 Japanese male users of deodorant in their teens to their 60s (100 from each decade)

Survey period: October 2006

Survey conditions: Internet questionnaire

#### 2. Sensory evaluation of axillary odor

Survey subjects: 118 healthy Japanese male users of deodorant aged 18-68 years.

Survey period: August 8–August 25, 2006 (average temperature: 30°C, average maximum temperature: 35°C)

Survey conditions: Subjects washed their armpits with unscented soap and wore an odorless T-shirt. After 24 h, we performed direct sensory evaluation of their axillary odor.



**Figure 1: Sensory Evaluation of Axillary Odor**

We performed direct sensory evaluation of the odor of both armpits of subjects from a distance of 2-3 cm.

### [Research Results]

- 1. The Body Odors Japanese Men are the Most Concerned About are Axillary Odor and Bad Breath, Because They Did Not Want to Be Termed "Smelly" by Women**

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After surveys on body odor with 600 Japanese men in their teens to their 60s as subjects were conducted, nearly 90% responded they “care about their own smell.” Further, the two smells most commonly indicated as the one about which men cared the most were “axillary odor,” at 42% (Figure 2) and “bad breath,” at 38%. The reason most commonly given for why men cared about body odor was “because [they] didn’t want to be called ‘smelly’ by a woman.” In particular, over 70% of men in their teens and 20s showed a high effect reflective of the male psychology of a generation aware of the manner in which they are perceived by the opposite sex.

In addition, over 90% of polled men responded that they cared about the odors of others, indicating a high sensitivity across the population toward not only one’s own smell but also that of others.

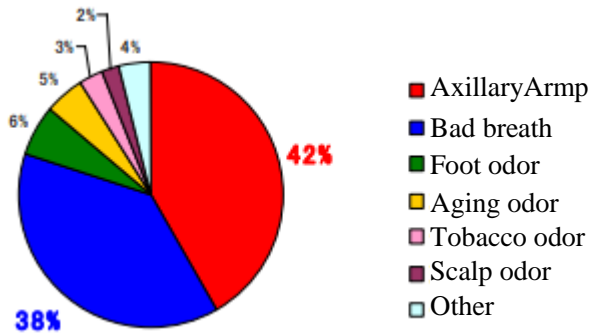


Figure 2: The body odors about which Japanese men cared most and the percentages thereof

**2. Young Men in their Teens and 20s Have the Strongest Axillary Odor. However, Considerable Individual Variation Exists**

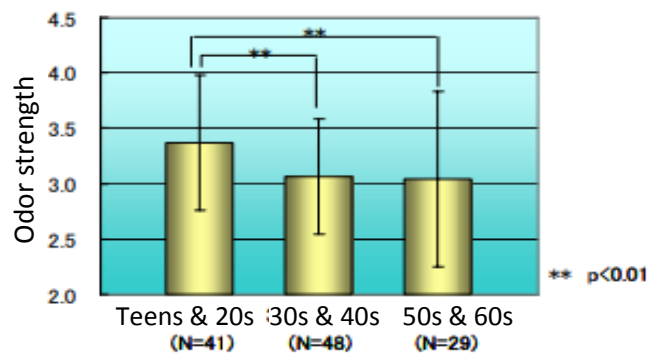
We evaluated axillary odor after 24 h by using a 6-point scale. Among the 118 men aged 18–68 years who were evaluated, approximately 40% had axillary odors that were “strong” or greater (4+ on the scale; Table 1). Odor scoring of 4 and above was strong enough to be perceived by other individuals in the vicinity; odors at this level require odor-preventative effects of deodorants. Odor strength was the greatest among men in their teens and 20s, and odor tended to decrease as subjects became older than 30 years (Figure 3). However, some elderly individuals had strong body odor, and subjects from within the same decade varied remarkably in the strength of their smells. Elderly individuals were conceived to have a distinctive “aging odor,” and thus body odor could be assumed to generally increase with age. However, with regard to axillary odor, the opposite was true: it appeared to decrease with age.

【Survey Method】

Table 1: Distribution of Strengths of Axillary Odors

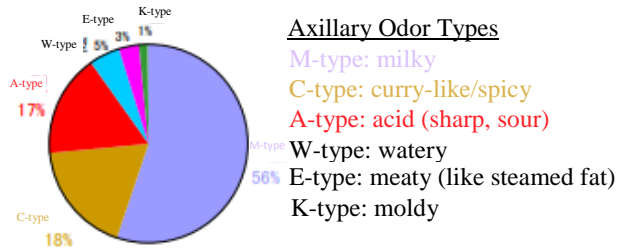
| Odor Strength: 6-point Scale (Directly Evaluated) | Percentage |
|---|------------|
| 0: Odorless                                       | 0          |
| 1: Faintly detectable axillary odor               | 0          |
| 2: Weak axillary odor (could not determine type)  | 10         |
| 3: Moderate axillary odor (could determine type)  | 54         |
| 4: Strong axillary odor                           | 33         |
| 5: Extremely strong axillary odor                 | 3          |

N = 118

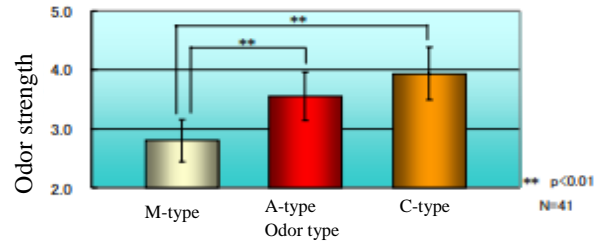


**3. The Three Most Common Types of Axillary Odor among Japanese Men are “Milky,” “Curry-like,” and “Acrid.”**

After sensory evaluation of the types of axillary odors of Japanese men, we found that they can be primarily separated into three types: M-type (milky), C-type (curry-like/spicy), and A-type (acrid; Figure 4). Further, after comparing individuals from the same decade that had each of these axillary odor types, we found that the C- and A-type odors were the strongest, and that C-type odors were particularly strong (Figure 5).



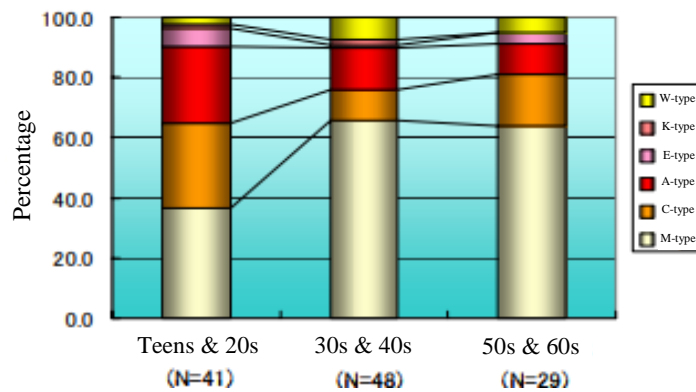
**Figure 4: Axillary Odor Types of Japanese Men and the Composition ratios**



**Figure 5: Comparison of Odor Strengths by Odor Type Comparison among Men in Teens and 20s (N = 41)**

**4. Axillary Odor Type Changes with Age. Among Men in Their Teens and 20s, “Curry-like” and “Acrid” Odors Are Common**

In order to evaluate the age-related changes in axillary odor types, we separated and compared men with each type of odor according to age (Figure 6). We found that the frequency of C- and A-type odors decreased and that of M-type odors increased with age. This suggested that the strength of body odors of men in their teens and 20s was attributed to the high prevalence of C- and A-type odors.

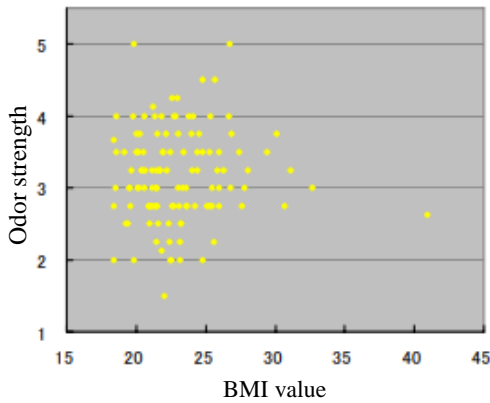


**Figure 6: Age-wise Comparison of Axillary Odor Types Subjects: 118 Japanese Men**

The differences in the distribution of odor strengths and types across different age brackets revealed by our research could possibly be attributed to the differences in lifestyle and eating habits, as well as the changes in body composition caused by age. However, a survey on eating habits conducted simultaneously to that described here did not find any clear differences between men in their teens and 20s and those in their 30s and 40s despite the clear difference in odor strength between these groups. This result implies that the decrease in odor strength and changes in odor type distribution found across age groups is a result of age-related reductions in basal metabolic rate and changes in secretory compounds. However, the mechanisms and particulars of this change remain largely unclear, and further studies are required in this regard.

**5. Obese = Sweaty = Strong-smelling? No!**

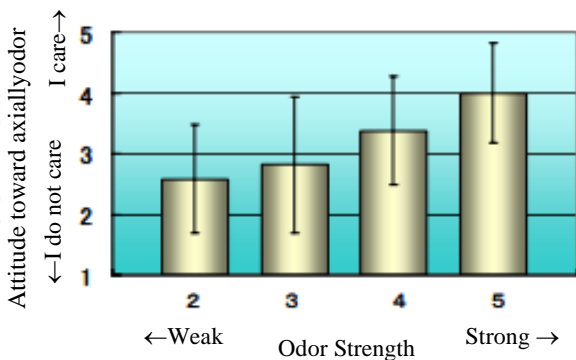
Generally, individuals with an obese body type perspire more. This has led to the preconception that obese individuals sweat more, making them smelly. However, no actual surveys of the relationship between obesity and odor have been conducted. Thus, we performed a correlation analysis of the degree of obesity (BMI value) with odor strength. We found absolutely no correlation between the degree of obesity and axillary odor strength (Figure 7). We also investigated the relationship between “predisposition to sweat” and “perspiration amount during the testing period,” and similarly found no correlation to odor strength. Axillary odor is known to be caused when metabolites and fat compounds secreted in the axillary breakdown and change into odor-causing compounds. However, this study indicates that “more sweat = stronger smell” is simply not true. Odor strength is remarkably influenced by the composition and concentration of compounds secreted during perspiration, as well as the rate at which they are broken down in the axillary, among other things.



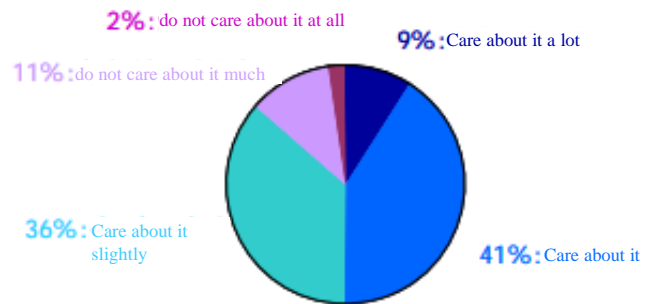
**Figure 7: The Relationship between Obesity and Odor Strength**  
 BMI Standard Values: 18.5–25 (>25 indicates obesity)

**6. About 13% of Individuals with Strong Axillary Odor Are Unaware of It.**

We asked the subjects for whom we conducted sensory evaluation of axillary odors “the degree to which [they] care about [their] axillary odor.” We observed that the stronger an individual’s odor, the more they care about it (Figure 8). However, we found that, among individuals with strong body odor (odor strength 4+)—nearly 40% of all polled individuals—13% responded that they “do not care about [their] axillary odor” (Figure 9), indicating that many individuals “do not care about their own strong body odor.”



**Figure 8: Relationship between Attitude toward Odor and Odor Strength**



**Figure 9: Attitudes of Subjects with Strong Odor toward Odor**  
 Subjects: Japanese men with odor strength 4+ (N = 44)

The above results clarify the differences in the strength and type of axillary odor of Japanese men according to age, as well as describe, for the first time, to our knowledge, the characteristics of the smell of axillary odors among modern Japanese men. Age-related differences in strength and type of odor are believed to be caused by physical phenomena associated with aging and differences in lifestyle and eating habits, but the mechanisms by which this pattern arises is not yet known; therefore, future studies are warranted in this regard.

At Mandom, we intend to use this knowledge to conduct detailed analysis regarding the causal factors of body odor, and to develop deodorant products for men with new, superior odor-preventing and odor-eliminating effects.