

## **Mandom reveals the actual state of the easily damaged male scalp and the improvement effect of scalp lotion**

Mandom Corporation (Headquarters: Osaka; CEO: Motonobu Nishimura; hereinafter, “Mandom”) conducted a study of the scalp in Japanese men, in collaboration with Ayako Ito, Director of the Medical Corporation Xanadu Ayako Ito Clinic.

Previous studies have shown that, compared with facial skin, the scalp shows less water content in the stratum corneum, a higher transepidermal water loss value (TEWL, lower barrier function), higher sebum secretion, and more reduced skin sensation toward stimuli such as heat and pain.

The results of conducting the present study in men showed that the skin sensation of the male scalp tend to become more blunted as a result of applying physical stimuli. The scalp was revealed to have a texture similar to that of the other skin site, and this texture becomes less pronounced with age. In addition, in the thin-hair group, classified by progressiveness of male-pattern alopecia, the scalp was found to be harder and to show higher sebum secretion than in groups of the same age that did not have thin hair.

These results suggest that the scalp is a site more easily damaged than the face, because it is more susceptible to dryness and has a lower barrier function, and that the damage might be left unaddressed due to reduced sensation.

Mandom confirmed that the topical application of a model lotion for the scalp increased the water content of the stratum corneum of the scalp, increased the elasticity of the scalp, decreased sebum secretion, and improved dandruff.

### **1. The scalp is damaged easily and the damage is not noticed**

The scalp is known to have less water content in the stratum corneum, as compared with the skin of the face, and a higher TEWL value, which is an index of skin’s barrier function (high TEWL value indicates low skin’s barrier function). In the present study, Mandom confirmed that the scalp of Japanese males had less water content than did the facial skin. The scalp is generally thought to be sticky, and wet, but actually the scalp has less water in the corneum stratum and a lower barrier function than that of the facial skin, the skin of the scalp becomes rough easily.

In addition, the temperature threshold of the scalp is higher than that of the skin of the arms, and it is known to have reduced sensation of temperature changes. The temperature threshold in the skin of the arms was shown to increase further when rubbed for a period of 3 minutes (Figure 2). Before rubbing, the temperature threshold of the scalp was higher than that of the arms, and although a significant difference was not shown, it was even higher after rubbing, as was true for the skin of the arms. This suggests that scalp damage might not be noticed when it occurs, because not only is the scalp originally blunted toward sensations of temperature change, it is even further blunted by actions such as forceful scratching.

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**2. The texture of the scalp becomes less pronounced with age**

Similar to facial skin, the scalp also has texture, which becomes less pronounced with age (Figure 3).

**3. Scalps in the thin-hair group were harder and had more scalp sebum.**

As an index of thin hair, the ratio of the diameter of the hair on the parietal side of the head to the diameter of hair on the occipital side was used to divide subjects in their 30s and 40s into a thin-hair group and a non-thin-hair group for analysis. The results confirmed that the scalps of subjects in the thin-hair group were harder (Figure 4) and had more scalp sebum (Figure 5) than those of subjects of the same age in the non-thin-hair group.

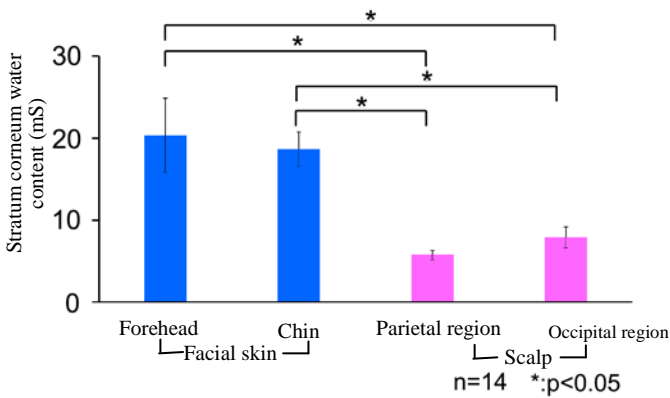
**4. The condition of the scalp improved with repeated application of model lotion for the scalp**

Model lotion for the scalp was applied repeatedly for 4 weeks on half of the head, which was then compared with the side of the head to which lotion was not applied. The results showed that application of the model lotion for the scalp increased the water content of the stratum corneum, resulting in a moist scalp (Figure 6), and increased the elasticity of the scalp, making it softer. Furthermore, a reduction in scalp sebum (Figure 8) and an improvement in dandruff were observed (Figure 9).

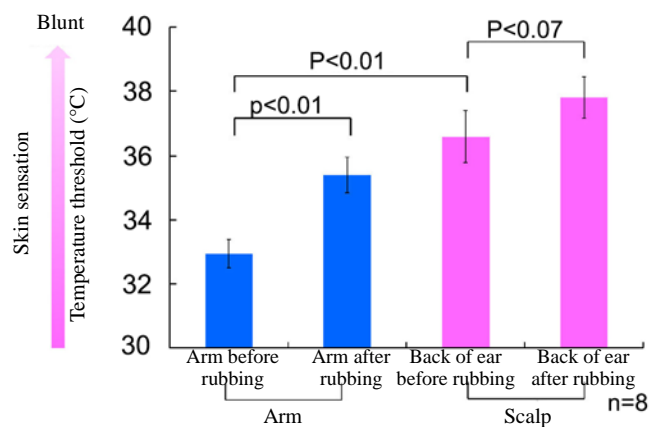
The results of this study are believed to show that skin-care habits for the scalp are useful for maintaining a healthy scalp. Mandom applied these findings in a scalp lotion intended for sale in Spring of 2016.

<References>

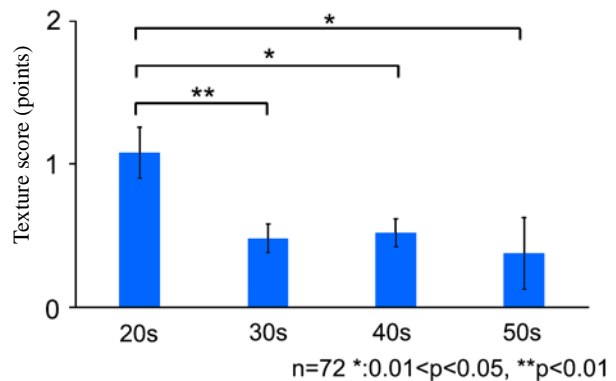
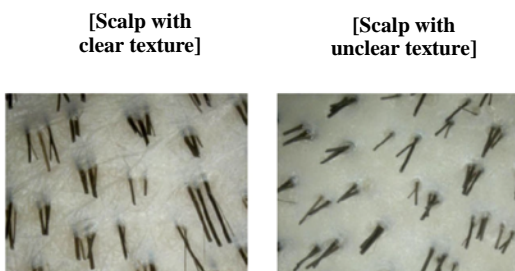
**Figure 1. Water content of the stratum corneum of the face and scalp of Japanese men.**



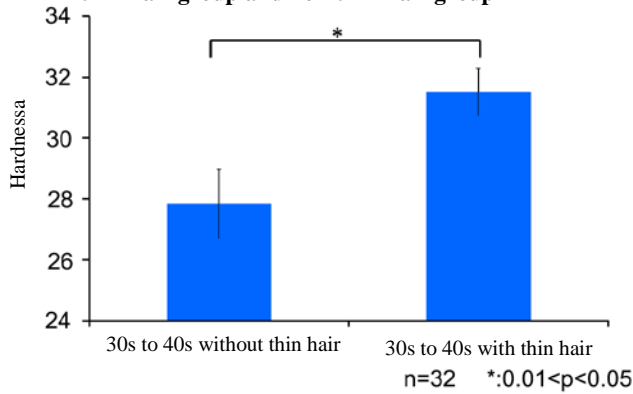
**Figure 2. Temperature threshold of the arms and the scalp and changes due to rubbing**



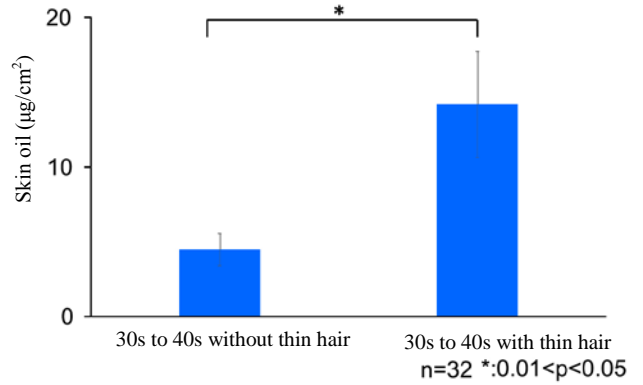
**Figure 3. Changes in the texture of the scalp by age group**



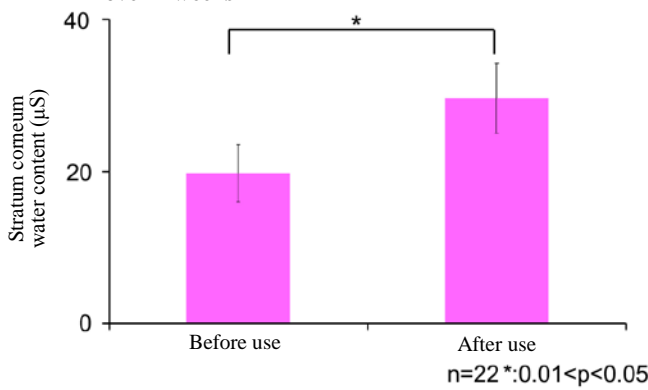
**Figure 4. Comparison of scalp hardness in the thin-hair group and non-thin-hair group**



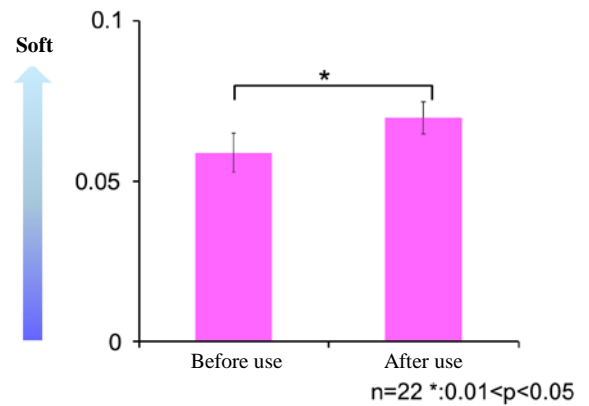
**Figure 5. Comparison of the scalp oil quantity in the scalp in the thin-hair group and non-thin-hair group.**



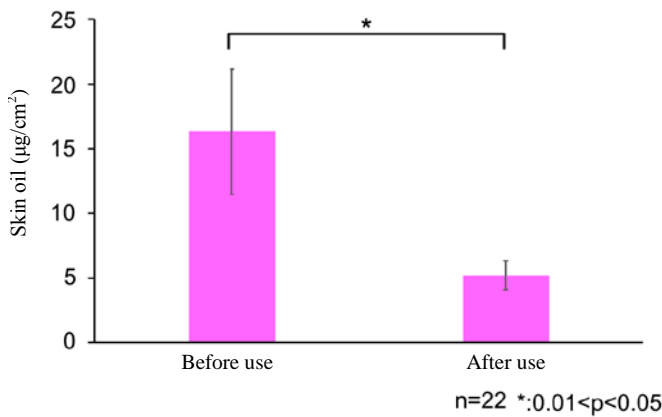
**Figure 6. Change in the water content of the stratum corneum due to repeated application of model scalp lotion over 4 weeks**



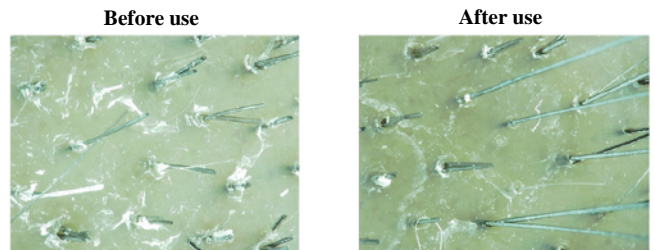
**Figure 7. Change in scalp hardness due to repeated application of model scalp lotion over 4 weeks**



**Figure 8. Change in scalp oils in the scalp due to repeated application of model scalp lotion over 4 weeks**



**Figure 9. Change in dandruff due to repeated application of model scalp lotion over 4 weeks**



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