

Introduction:

The human skin is a substantial and intricate organ that displays a considerable degree of variation across different areas of the body. One area of particular interest is the skin of the lips, which stands distinct due to a few unique characteristics. Notably, it is thinner with a sparse stratum corneum, lacks sebaceous and sweat glands which are vital for moisturization, and has a heightened rate of transepidermal water loss, leading it to dry out more quickly compared to other regions such as the arm. This fascinating divergence presents an opportunity for scientific exploration, holding implications not just for the field of dermatology but also significantly influencing advancements in the cosmetic industry. Hydration is a significant concern for lipstick consumers, with some noting that while matte lipsticks do not transfer easily, they can be drying. To provide a deeper understanding of this phenomenon, a corneometer is incorporated to evaluate lip and arm skin hydration, and a correlation between panelists' perception and tested data was observed too. Through the comparative feasibility study of the different types of lipsticks both on the arms and on the lips, distinct characteristics are identified and evaluated.

The unique lip structure

Lip skin is significantly thinner than the skin elsewhere on the body, containing only 3 to 5 cell layers compared to 15 to 16 layers found in other areas [1]. This feature makes it more sensitive to environmental factors that can cause irritation. The lack of sebaceous glands in the lip skin reduces its ability to hold moisture, a condition worsened by a higher rate of water loss through the skin's surface. Consequently, lips tend to dry out more quickly, making it necessary to regularly use products that help retain water and draw moisture from the environment to keep the lips hydrated and healthy.

Upper and lower lip hydration comparison

Lip hydration level differences are evaluated using a corneometer [2]. This tool is straightforward to use and non-invasive, making it ideal for obtaining accurate readings of the lip skin's moisture content. This feasibility study engaged 18 participants (9 male and 9 female) who were systematically chosen from a broad age range of 24 to 68 years old. Five testing points on the lips were chosen to test their upper and lower lip hydration. Participants were selected based on specific inclusion criteria which required them to be devoid of lip pathologies, skin lesions, or evident signs of lip dryness, thereby ensuring the integrity of the data pertaining to lip hydration.

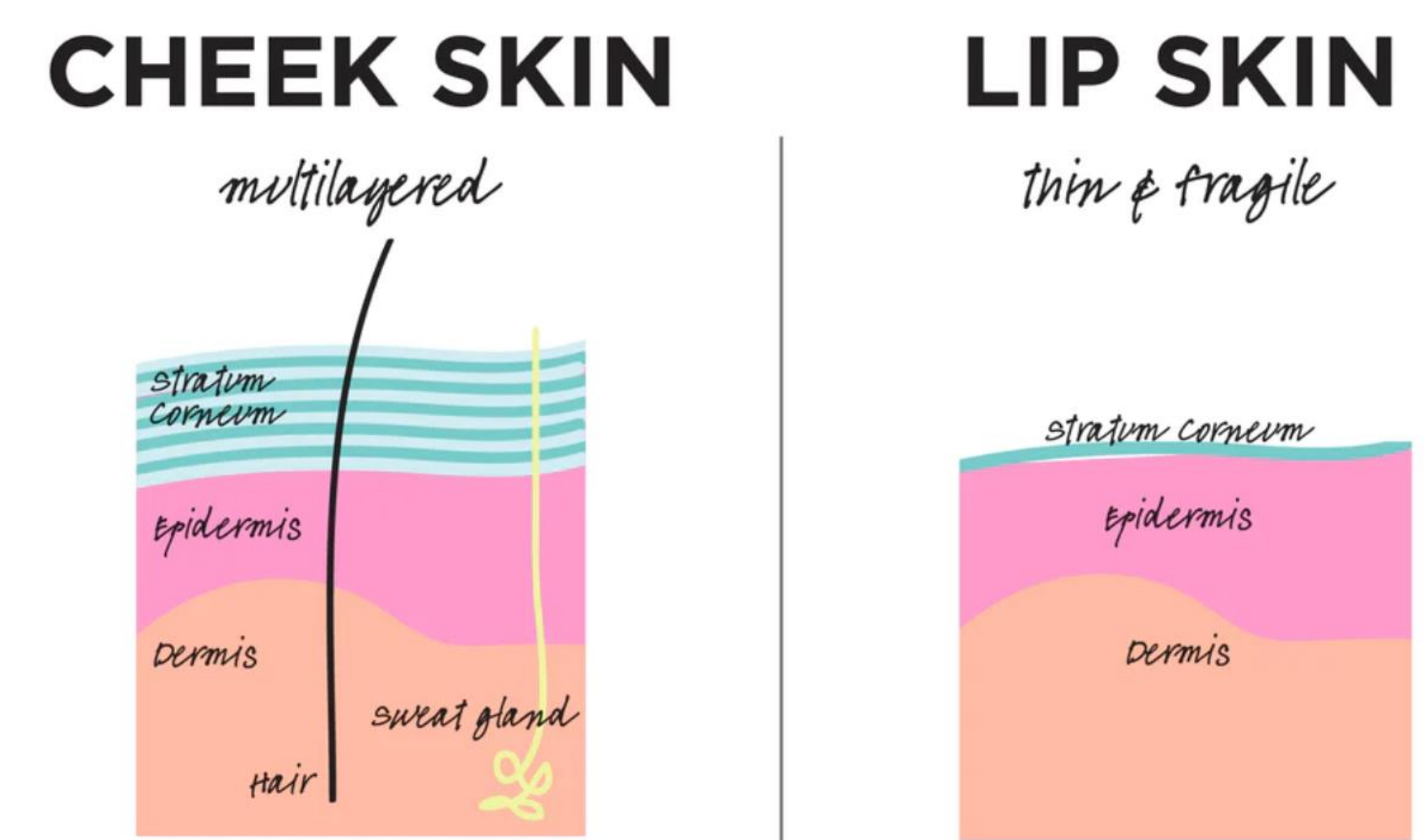


Figure 1. Anatomy of lip skin.

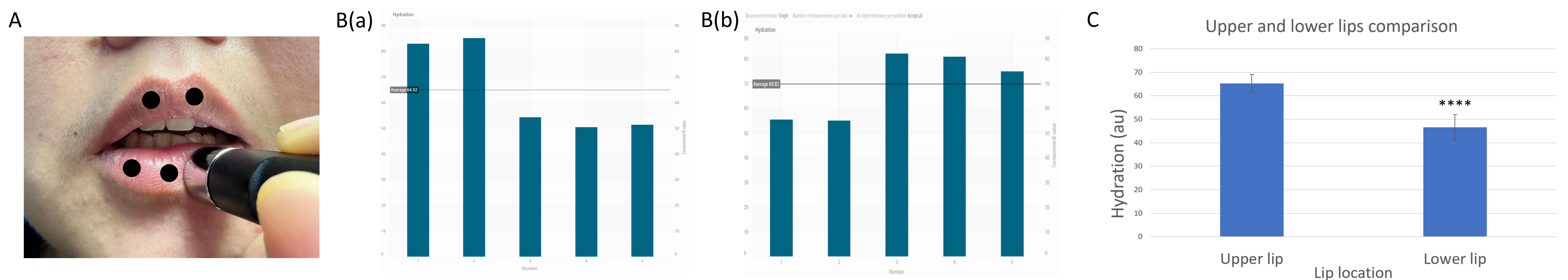


Figure 2. A: The sampling locations on the lips; B: most panelists exhibit higher hydration in their upper lips (a), while only a few show the opposite (b); C: lower lip is 29% less hydrated than upper lip.

Lip skin and arm skin hydration comparison

Hydration is a significant concern for lipstick consumers, with some noting that while matte lipsticks do not transfer easily, they can be drying. To provide a deeper understanding of this phenomenon, the corneometer is incorporated to evaluate lip hydration after a 2-hour application of the lipstick. By analyzing the products' impacts both on the arm and lip skin, significant differences are found in hydration behavior based on the application site, a phenomenon illustrated in Figure 3. Interestingly, arm skin consistently retains less moisture than lip skin (40 vs 53 au, $p=2.3E-05$), highlighting the fundamental differences between the two skin types in terms of composition and function. It is found that all lipsticks tested, regardless of brand or type (including Vaseline - the positive control), enhance arm skin hydration to different extents, ranging from 16% to 67%. It is worth noting that the lip skin, which naturally holds more water, undergoes noticeable changes when in contact with different lipsticks (-13% to 57% hydration increase). This stresses the effect of lipstick formulations on hydration levels, and these data align with panelists' perceptions. Another interesting finding from this study is the higher water content in the upper lips compared to the lower ones, suggesting a foundational difference in the anatomical and physiological attributes of the upper and lower lips.

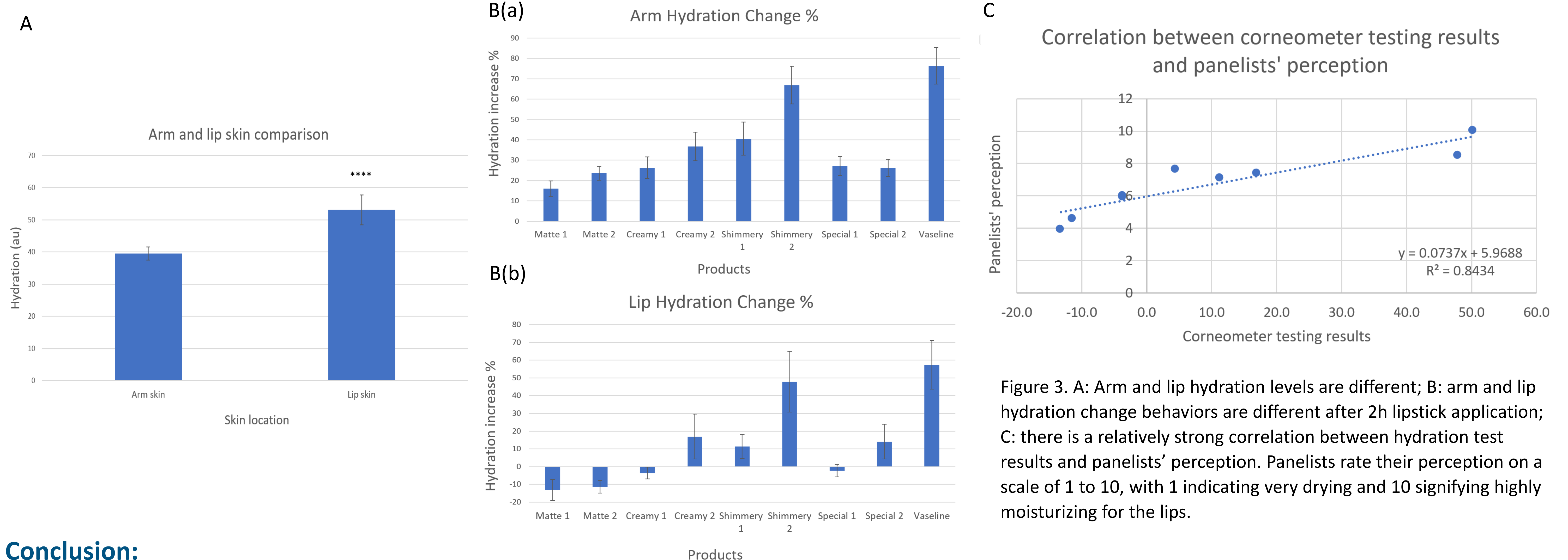


Figure 3. A: Arm and lip hydration levels are different; B: arm and lip hydration change behaviors are different after 2h lipstick application; C: there is a relatively strong correlation between hydration test results and panelists' perception. Panelists rate their perception on a scale of 1 to 10, with 1 indicating very drying and 10 signifying highly moisturizing for the lips.

Conclusion:

In conclusion, the lip skin, inherently thinner and lacking sebaceous and sweat glands, is predisposed to quicker drying. This feasibility study, using a corneometer, offers a comprehensive examination of hydration levels on the lips and compares them to arm skin after lipstick application. Notably, despite their thin structure, lip skin retains more moisture than arm skin, and is more sensitive to different formulations of lipsticks. The application of various lipsticks showcases an impact on lip hydration levels, which correlates with the perceptions of panelists. Furthermore, the study shows a difference between the upper and lower lips in terms of water content, shedding light on potential variations in their anatomical and physiological makeup. These insights not only deepen our understanding of lip skin hydration dynamics but also emphasize the influence of cosmetic formulations on the skin.

Reference:

- <https://cocofloss.com/blogs/oral-health-guide/soften-your-lips>
- López Jornet, María Pía, Fabio Camacho Alonso, and Ana Belén Rodríguez Espin. "Study of lip hydration with application of photoprotective lipstick: influence of skin phototype, size of lips, age, sex and smoking habits." (2010).