Use of the novel device, gpskin® for measuring TEWL

Sanhun Kim*, Ji Yeon Han and Eunjoo Kim
AMOREPACIFIC R&D Center, 1920 Yonggu-daero, Giiheung-gu, Yongin-si, Gyeonggi-do, 17074, South Korea

Introduction
- The stratum corneum, which is the outer layer of the epidermis, protects against water loss as role in skin barrier function. Therefore, measuring the TEWL (transepidermal water loss) is to evaluate the skin barrier function non-invasively.

- gpskin® (GPOWER) is a novel closed chamber system device contains the sensor for measuring water vapor gradient on the surface of skin to evaluate TEWL. It covers TEWL range up to 80 g/m²h, weight is just 40 g and costs 25-144 times lower than existing devices.

- The aim of this study is to verify the repeatability and reproducibility of the new device and compare with other devices.

Methodology
- 10 Korean subjects in their 20s to 40s were enrolled (6 females and 4 males; average age 32.0). Prior to the measurements, subjects washed their forehead and waited for 15 min for acclimation. The room condition was 23±2°C and 45±5% relative humidity.

- Repeatability & reproducibility test
  TEWL measurement was replicated by 2 gpskins on the forehead.

- Correlation & sensitivity test
  Correlation among the gpskin, Vapometer (Defin), a closed chamber system, and Tewameter (Courage & Khazaka), an open chambers system, was evaluated on the forehead, cheek, chin, and forehead.

- Statistical analysis
  RM-ANOVA post hoc Bonferroni test, Wilcoxon signed rank test, Pearson’s correlation coefficient, One-way ANOVA post hoc Tukey and Bonferroni test was performed using SPSS 20 (IBM) with a significance level of p < 0.05.

Results

- Repeatability test
  It did not appear statistically significant change among triple measurements (p = 1.000).

- Reproducibility test
  There was no significant difference between 2 identical devices measurements (p = 0.482).

- Correlation test
  Pearson correlation coefficients of gpskin and other devices was 0.778 (gpskin vs. Vapometer) and 0.822 (gpskin vs. Tewameter). However, correlation coefficient between existing devices (Vapometer vs. Tewameter) was slightly higher than others (0.923), p-values of all cases were 0.000.

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Conclusions
- gpskin demonstrated reliable measurements with high repeatability and reproducibility, and the results showed significant correlation with other TEWL measuring devices.
- Although it appeared lower values than other TEWL measuring devices, it is light and inexpensive in which allows people to check their skin barrier function in daily life.

References