

# Assessing the Gentleness of a Sonic Skin Care Brush for Daily Use

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## Introduction

Facial cleansing is an important part of personal hygiene. Improperly cleansed skin and use of inefficient facial cleansing products can result in clogged pores from excessive oil accumulation. Oil tends to saturate dead skin cells making it difficult for natural sloughing of skin cells to occur. The accumulation of dead skin cells results in dry, flakey, and dull skin.

A sonic skin care brush (SB) was developed to gently yet effectively cleanse the skin (1,2). The sonic skin care brush was shown in clinical studies to remove more casual sebum (a surrogate marker to evaluate removal of dirt and oil) than manual cleansing while leaving the skin feeling smoother and cleaner (2). As part of any skin cleansing regimen, a slight level of skin cell removal is anticipated.

Currently, various types of facial exfoliants are used to remove dead skin cells and trapped dirt. When using exfoliants, care must be taken not to exfoliate excessively and thus avoid irritation.

In this study, safety and gentleness of the SB was evaluated utilizing a cosmetic industry exfoliation protocol (3) measuring transepidermal water loss (TEWL; 3,4) and verifying the SB's gentleness without irritation or damage to the skin. We additionally determined the extent of exfoliation utilizing a novel artificial skin color methodology where the color intensity of artificially tanned skin was measured before and after use of the cleansing products. The SB, a nylon facial pad (FP), and a daily facial scrub (FS) were compared to a standard exfoliation curve generated through use of D-Squame skin sampling discs.

## Objective

To evaluate the safety and gentleness of a sonic skin care brush for daily cleansing using an exfoliation model (compared to over-the-counter daily facial scrub and pad).

## Methods

11 consenting subjects between the ages of 15-55 years of age and with dry skin on their lower legs participated in the study.

Equipment:

- Skin temperature [(T) recorded using an infrared temperature scanner, Dermatemp™]
- CI (color intensity) measured using the DermaSpectrometer (Cortex Tech., Denmark)
- Trans Epidermal Water Loss [(TEWL)] measured using the VapoMeter (Delfin Tech., Finland).

T and CI measurements taken in duplicate; TEWL in triplicate.

## Methods-Continued

### Protocol

Day 1: Using an exfoliation tanning methodology, the skin of the lower leg (shaven) was stained with a commercial self-tanning solution to artificially darken skin's pigment.

Day 2: Twenty-four hours after tanning, test products were compared to a standard curve corresponding to varying levels of exfoliation. Eight test sites were identified within the tanned area; four 1" by 1" sites for the standard curve and four 2" by 2" sites for treatment with the test products. An additional 1" by 1" site located outside the tanned borders served as a untreated/untanned control. Prior to treatment, baseline readings for skin temperature (T), Color Intensity (CI), and Trans Epidermal Water Loss (TEWL) were taken from each test site.

Standard curves were created using D-Squame skin sampling discs (CuDerm Corp., Dallas, TX). D-Squame discs uniformly remove corneocytes in the superficial stratum corneum. Zero, 5, 10 or 15 D-Squame discs were used within each of four 1" by 1" defined sites within the tanned area.

The test products were assigned to one of the four 2" by 2" sites. Treatments were administered by an unblinded esthetician equivalent to excessive use of the product (1 minute for each treatment and treatment area).

- sonic skin care brush with water (SB)
- a nylon facial pad with water (FP)
- a daily facial scrub (FS)
- negative control [no treatment (C)]

Immediately after treatment, a damp cloth was placed over the treatment area to remove excess water.

T, CI, and TEWL measurements were repeated 15 minutes following the above treatments.

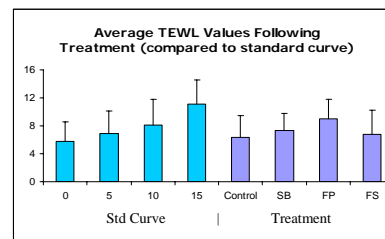
## Results

**TEWL:** TEWL values were generated for the D-Squame skin sampling disc standard curve and the cleansing treatment areas pre- and post- treatment (Figure 1). TEWL values for each subject and time point were averaged within treatment. TEWL values are expected to stay the same or increase depending on the extent of exfoliation and disruption of the stratum corneum or irritation. One-way Analysis of variance (ANOVA) was used to assess the treatment differences in the mean change in TEWL values recorded pre- to post- treatment (C, SB, FS, FP); differences where post-treatment values were lower than pre-treatment values (suggesting no change in TEWL) were assigned a value of zero. Fewer non-zero values were observed for FS and SB than FP.

## Results-Continued

ANOVA ( $p > 0.003$ ) confirmed differences between treatment groups. Simultaneous 95% confidence intervals for the difference in mean delta TEWL for all pairwise comparisons were generated. Differences between FP to C, FP to FS, and FP to SB were statistically significant. SB and FS were not statistically significantly different than C suggesting that SB and FS do not significantly disrupt the skin barrier.

Figure 1. Mean TEWL values recorded following one minute use of the test products [control (no treatment), SB, FP, and FS] or following 0, 5, 10 or 15 skin lifts with D-Squame discs.



**Color Intensity:** The mean color intensity values for the D-Squame disc lift standard curve and treatment areas are illustrated in Figure 2. Color intensity is expected to decrease as stained skin cells are removed through tape lifts or cleansing treatment. Analysis of variance was used to assess the treatment differences in the mean change in color intensity observed pre- to post- treatment (C, SB, FS, FP); differences where post-treatment values were higher than pre-treatment values were assigned a value of zero. ANOVA confirmed ( $p > 0.001$ ) differences between C and SB, C and FP, and FS and FP.

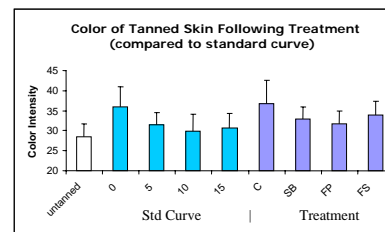


Figure 2. Mean color intensity recorded following one minute use of the test products [control (no treatment), SB, FP, and FS] or following 0, 5, 10 or 15 D-Squame disc lifts.

## Results-Continued

**Temperature:** No differences in skin temperature were observed pre- to post- treatment following 0, 5, 10, or 15 disc lifts or following the cleansing methods.

## Conclusion

TEWL, skin temperature, and a novel exfoliation model were utilized to confirm the gentleness and safety of a new sonic skin care brush. The 3 cleansing products (SB, FS, and FP) were used under exaggerated conditions (1 minute use in 2" x 2" treatment areas). A stripped skin model was used to generate a standard curve for exfoliation. D-Squame discs removed superficial layers of the stratum corneum. A standard curve of 0, 5, 10 and 15 disc lifts provided a controlled range of exfoliation.

Using the artificially tanned skin exfoliation model, all treatments fell within the range of the standard curve; therefore only removing skin cells within the superficial stratum corneum. TEWL measurements for all cleansing methods fell within the range of the standard curve; SB and FS were not statistically different than the untreated control. Using these methodologies, a new sonic skin care brush has proven gentle and safe for daily use (similar to a daily facial scrub and pad) without disruption to the skin barrier.

## References

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## Disclosure of Support

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