

**Tradename:** AC LumiVitis

**Code:** 21032

**CAS #:** 8013-01-2 & 85594-37-2 (or) 84929-27-1 & 68333-16-4 (or) 1686112-36-6 (or) 9015-54-7

**Test Request Form #:** 14120

**Lot #:** 9418748

**Sponsor:** *Active Concepts, LLC; 107 Technology Drive Lincolnton, NC 28092*

**Study Director:** *Daniel Shill*

**Principal Investigator:** *Kayla Goodson*

**Test Performed:**

Transepidermal Water Loss (TEWL) Study

**Introduction**

As the largest human organ, the skin's integrity is critical to properly function as a physical barrier and maintenance of a healthy appearance for aesthetics. Moisture retention is a fundamental component to the preservation of the skin's protective barrier function. Transepidermal water loss (TEWL) is the passive evaporation of water across the stratum corneum to the external environment because of the water vapor pressure gradient on both sides of the skin barrier. In healthy skin, TEWL is inversely proportional to skin hydration (i.e., decreased TEWL indicates properly hydrated skin). However, when the skin's protective barrier is compromised, TEWL levels are high and the skin feels dry, flaky, and rough. High TEWL levels, and reduced skin hydration, are correlated with skin aging and seen in many skin diseases. Consequently, moderating excessive TEWL improves the skin's protective barrier function and contributes to the appearance of healthier looking skin.

Accordingly, a transepidermal water loss study was conducted to evaluate the moisture retention properties of **AC LumiVitis**.

**Study Principle**

TEWL measurements are made by placing a probe on the skin of preidentified test sites. By assessing changes in local humidity above ambient values the TEWL probe measures changes in water vapor density in a defined area over time. The controls and test materials are applied to the skin test sites twice a day and TEWL is measured weekly.

**Materials**

- A. **Equipment:** DermaLab Skin Combo (Transepidermal Water Loss Probe)
- B. **Products:** Base Lotion (Cetaphil® Moisturizing Cream for All Skin Types)
- C. **Software:** Excel Analysis ToolPak (Microsoft)

## Methods

20 volunteers between the ages of 22 and 56, who were known to be free of any skin pathologies with Fitzpatrick skin types I to III, participated in this study (Table 1).

**Table 1.** The Fitzpatrick Classification of Skin Types Chart<sup>1</sup>

Fitzpatrick Skin Type Descriptions*	
Skin Type	Description
I	Always burns, never tans
II	Burns easily, tans minimally
III	Burns moderately, tans to light brown
IV	Burns minimally, tans to moderate brown
V	Rarely burns, tans to dark
VI	Never burns, least sensitive to changes

\*Adapted from The Surgeon General's Call to Action to Prevent Skin Cancer

Three randomly assigned test sites were identified on the volar forearm of participants, and baseline moisture measurements were recorded after participants were acclimated in a temperature-controlled room for five minutes to ensure measurements were not skewed and reflective of real-world conditions. Following baseline measurements, participants applied 0.2 g of each test material to their volar forearms twice daily for four weeks. Moisture measurements were recorded once weekly over the four-week study period. The skin test site conditions and treatments are described below (Table 2). All lotion formulations and the Base Lotion were adjusted to a direct pH of 5.0 – 5.5 (Table 2). The Base Lotion utilized in this study was Cetaphil® Moisturizing Cream for All Skin Types.

**Table 2.** Descriptions of the Conditions and Treatments for each Skin Test Site

Skin Test Site	Condition	Treatment / Test Article Application Description	pH
1	Untreated Control	None	-----
2	Base Lotion	Base Lotion	5.3
3	2.0% AC LumiVitis	2.0% AC LumiVitis in Base Lotion	5.2

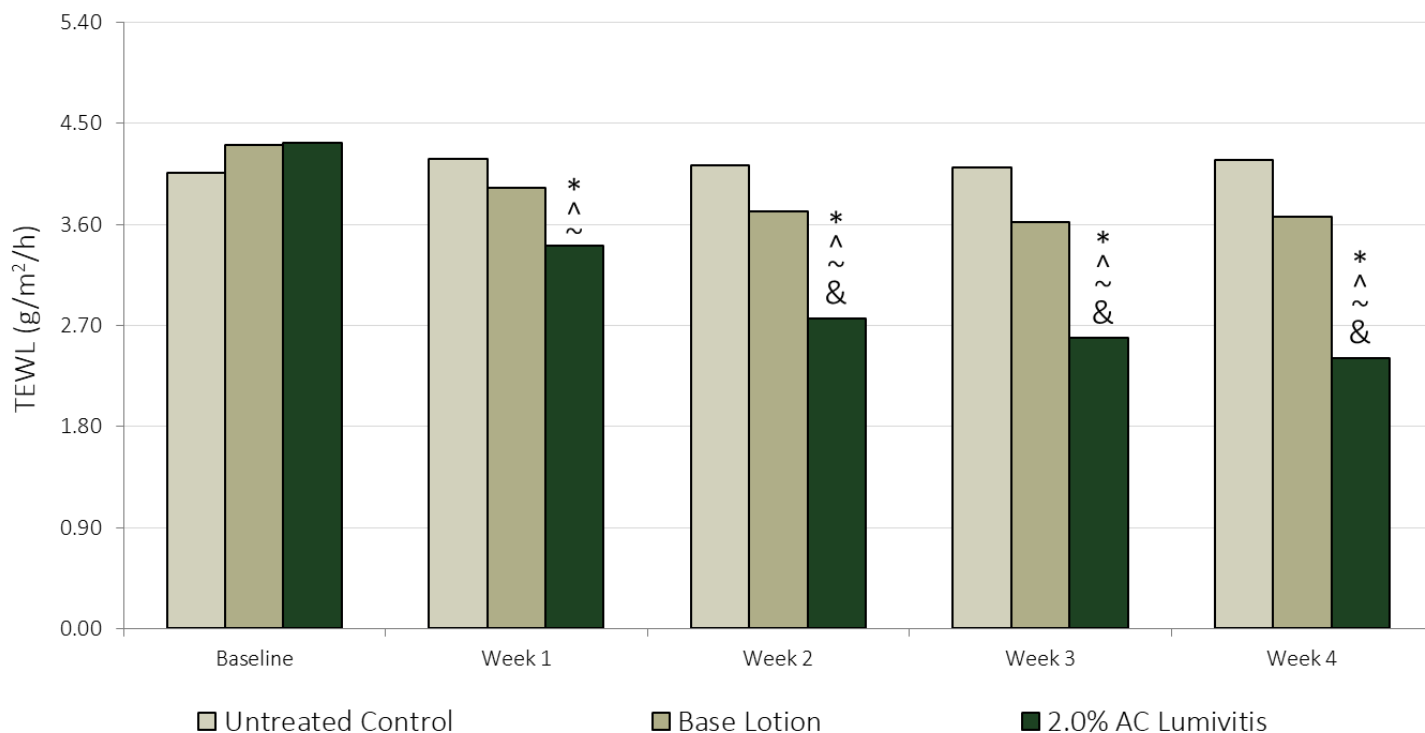
An average of three consecutive TEWL measurements per condition at each time point was recorded and expressed as g/m<sup>2</sup>/h. The percent change in TEWL values was calculated for each test site at every timepoint relative to Baseline values, using the following equation:

$$\text{Percent Change (\%)} = \frac{TEWL_{Week} - TEWL_{Baseline}}{TEWL_{Baseline}} \times 100$$

## Results

The data obtained from this study met criteria for a valid study as the Untreated Control and Base Lotion performed as anticipated. Application of 2.0% AC LumiVitis twice a day for four weeks demonstrated effective moisture retention properties by reducing TEWL throughout the study duration.

## Transepidermal Water Loss AC Lumivitis



**Figure 1.** TEWL Measurements Overtime. \* indicates significance ( $p \leq 0.05$ ) compared to Baseline values. ^ indicates significance ( $p \leq 0.05$ ) compared to Untreated Control within the same timepoint. ~ indicates significance ( $p \leq 0.05$ ) compared to Base Lotion within the same timepoint.

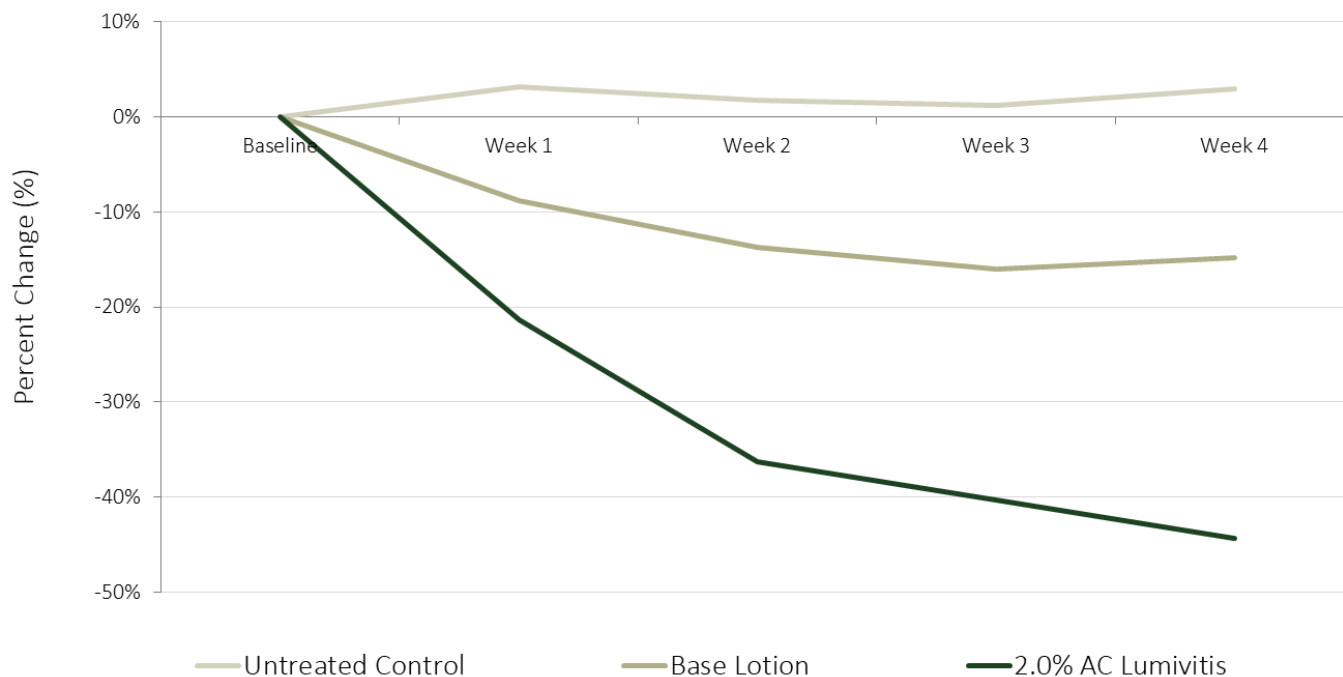
**Table 3.** T-test Analysis of TEWL Values After Four Weeks of Application. \* indicates significance ( $p \leq 0.05$ ) compared to Baseline values.

	Untreated Control	Base Lotion	2.0% AC LumiVitis
<b>P-value</b>	0.923	0.082	0.001*

**Table 4.** T-test Analysis of TEWL Values After Four Weeks of Application. ^ indicates significance ( $p \leq 0.05$ ) compared to Untreated Control within the same timepoint. ~ indicates significance ( $p \leq 0.05$ ) compared to Base Lotion within the same timepoint.

	Untreated Control vs Base Lotion	Untreated Control vs 2.0% AC LumiVitis	Base Lotion vs 2.0% AC LumiVitis
<b>P-value</b>	0.122	0.006^	0.013~

## Change in Transepidermal Water Loss AC Lumivitis



**Figure 2.** Percent Change in Transepidermal Water Loss Relative to Baseline Values

### Discussion

The ability of **AC LumiVitis** to retain skin moisture was assessed via TEWL throughout four weeks of twice daily application. As shown in Figure 1 and 2, TEWL did not significantly change throughout the study with the Untreated Control test site, indicating consistent moisture retention (Table 3). Similarly, TEWL was not significantly altered throughout the study with Base Lotion application, indicating the Base Lotion does not exert significant moisture retention on the skin (Figures 1, 2; Table 3). Conversely, applying 2.0% **AC LumiVitis** for four weeks significantly reduced TEWL by 44% (Figures 1, 2; Table 3). These results demonstrate **AC LumiVitis** has effective moisture retention properties.

Similar results are shown when examining the collective effect between each condition. There is no difference in TEWL between the Untreated Control and Base Lotion after four weeks of application (Figure 1; Table 4). Moreover, applying 2.0% **AC LumiVitis** significantly reduced TEWL compared to the Untreated Control and Base Lotion throughout the four week study duration (Figure 1; Table 4). These results demonstrate **AC LumiVitis** elicits moisturization retention with repeated application up to four weeks.

Taken together, these results indicate **AC LumiVitis** reduces TEWL when added to personal care applications at recommended use levels. Importantly, the absence of a dry down phase prior to baseline measurements emphasizes these results and is more reflective of a real-world consumer application experience. Collectively, **AC LumiVitis** demonstrates moisture retention properties which improves the skin's protective barrier function and contributes to the appearance of healthier looking skin.

## References

1. Sharma AN, Patel BC. Laser Fitzpatrick Skin Type Recommendations. [Updated 2022 Mar 9]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK557626/>