

**Tradename:** AC ExoCalm

**Code:** 60192

**CAS #:** 7732-18-5 & 84775-66-6 & 123465-35-0 (or) 8002-43-5

**Test Request Form #:** 11949

**Lot #:** 9400822

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

**Study Director:** Daniel Shill

**Principal Investigator:** Kayla Patterson

**Test Performed:**

Brightness Study

**Introduction**

Skin luminosity is referred to as the intensity of light reflected from the skin's surface. Increasing skin luminosity brightens the appearance of skin and enhances natural radiance. By enhancing skin brightness, the appearance of dark and dull skin is lessened, which is highly desired by consumers.

Accordingly, a Brightness Study was conducted to evaluate the ability of **AC ExoCalm** to increase skin luminosity. The key active ingredient in **AC ExoCalm**, *Glycyrrhiza glabra* (Licorice) Root Extract, was tested to demonstrate the superior nature of Bioauthentic Exosomes as a delivery system.

**Study Principle**

L\* measurements are made by placing a probe on the skin of preidentified test sites. The DermaLab Colori Probe evaluates skin color and measures CIEL\*a\*b numbers. Higher L\* values are indicative of more brightness from the skin. The controls and test materials are applied to the skin test sites once in a 24-hour period and are measured at various time points.

**Materials**

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

## Methods

This study was conducted with 12 participants between the ages of 23-40, free of any known skin pathologies, with Fitzpatrick skin types I to IV (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	

Four randomly assigned test sites were identified on the volar forearm of participants as well as both halves of their face, and baseline L\* measurements were recorded. Following baseline measurements, participants applied 0.2 g of each treatment to their volar forearm and face once during a 24-hour period. L\* measurements were recorded at three time increments after the application of test materials. The skin test site conditions and treatments are described below (Tables 2, 3). 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 Forearm Test Site

Forearm Test Site	Condition	Treatment / Test Article Application Description
1	Untreated Control	None
2	Base Lotion	Base Lotion
3	0.4% <i>Glycyrrhiza glabra</i> (Licorice) Root Extract	0.4% <i>Glycyrrhiza glabra</i> (Licorice) Root Extract in Base Lotion <sup>#</sup>
4	2.0% AC ExoCalm	2.0% AC ExoCalm in Base Lotion

<sup>#</sup>This concentration of *Glycyrrhiza glabra* (Licorice) Root Extract is equivalent to the amount present in 2.0% AC ExoCalm

**Table 3.** Descriptions of the Conditions and Treatments for each Face Test Site

Face Test Site	Condition	Treatment / Test Article Application Description
1	Base Lotion	Base Lotion
2	2.0% AC ExoCalm	2.0% AC ExoCalm in Base Lotion

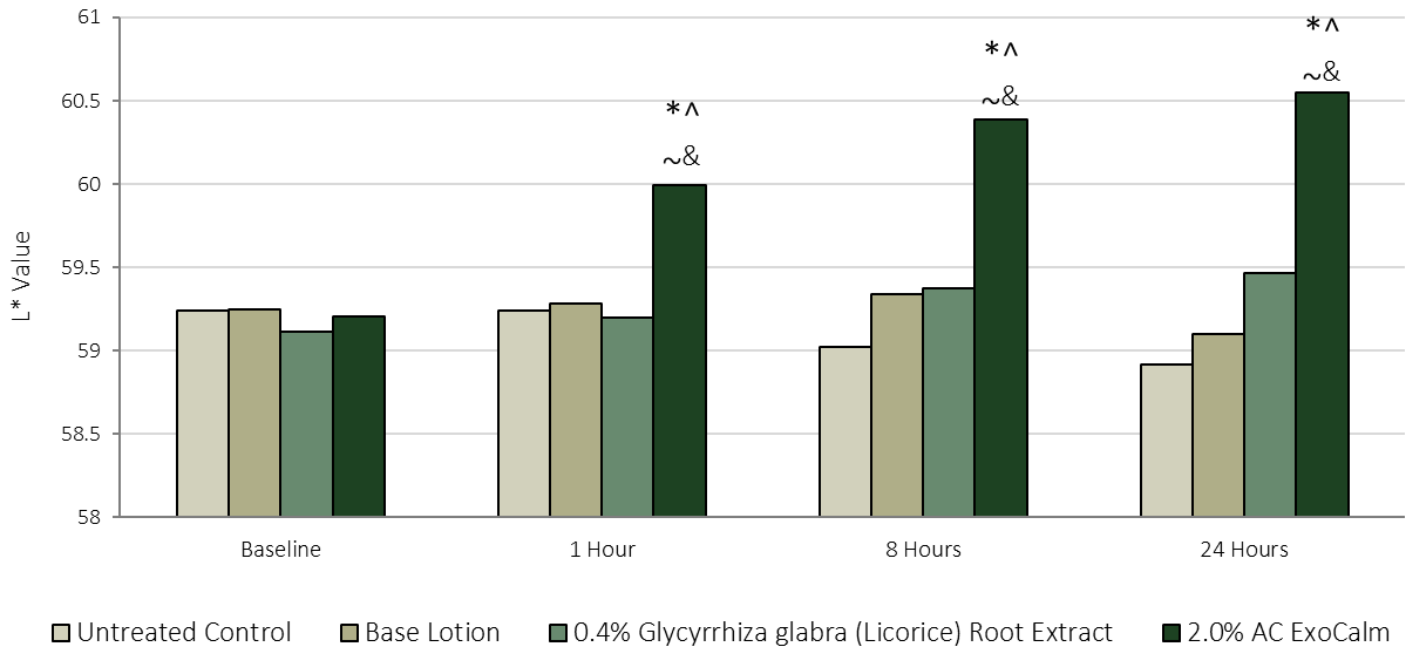
An average of three consecutive L\* measurements per condition at each time point was recorded. The percent change was calculated for condition at every timepoint relative to Baseline values, using the following equation:

$$\text{Percent Change (\%)} = \frac{L^* \text{ Value}_{\text{Time}} - L^* \text{ Value}_{\text{Baseline}}}{L^* \text{ Value}_{\text{Baseline}}} \times 100$$

## Results

The data obtained met criteria for a valid study as the Untreated Control and Base Lotion performed as anticipated. Application of 2.0% **AC ExoCalm** once in a 24-hour period demonstrated effective immediate and short-term brightening properties by enhancing skin brightness on both the volar forearms and the face throughout the study duration.

## Average Forearm Brightness AC ExoCalm



**Figure 1.** Forearm Brightness Overtime. \* indicates significance ( $p \leq 0.05$ ) compared to Baseline within the same condition. ^ 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. & indicates significance ( $p \leq 0.05$ ) compared to *Glycyrrhiza glabra* (Licorice) Root Extract within the same timepoint.

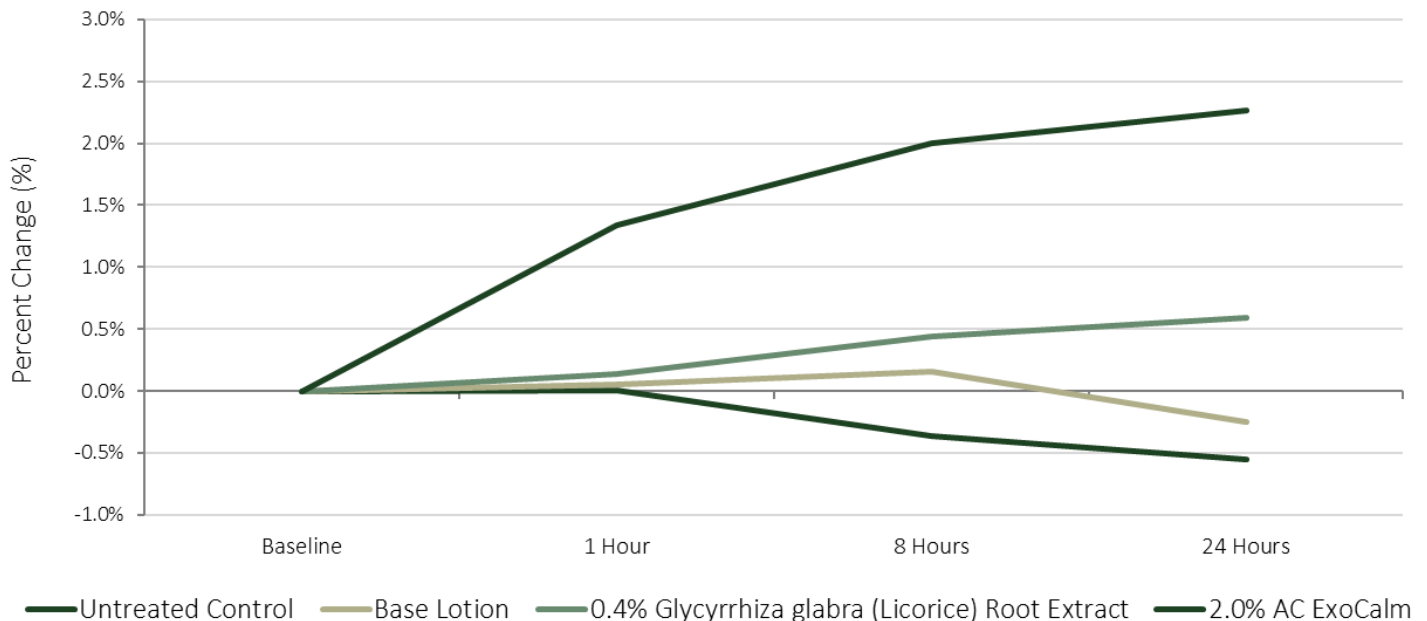
**Table 4.** Results from T-test Analyses of L\* Values from Baseline to 8 Hours and 24 Hours After Application. \* indicates significance ( $p \leq 0.05$ ) compared to Baseline values.

	Untreated Control	Base Lotion	0.4% <i>Glycyrrhiza glabra</i> (Licorice) Root Extract	2.0% AC ExoCalm
8 Hours After Application	0.762	0.890	0.743	0.008*
24 Hours After Application	0.683	0.818	0.671	0.005*

**Table 5.** Results of T-test Analysis of L\* Values 8 Hours After 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. & indicates significance ( $p \leq 0.05$ ) compared to *Glycyrrhiza glabra* (Licorice) Root Extract within the same timepoint.

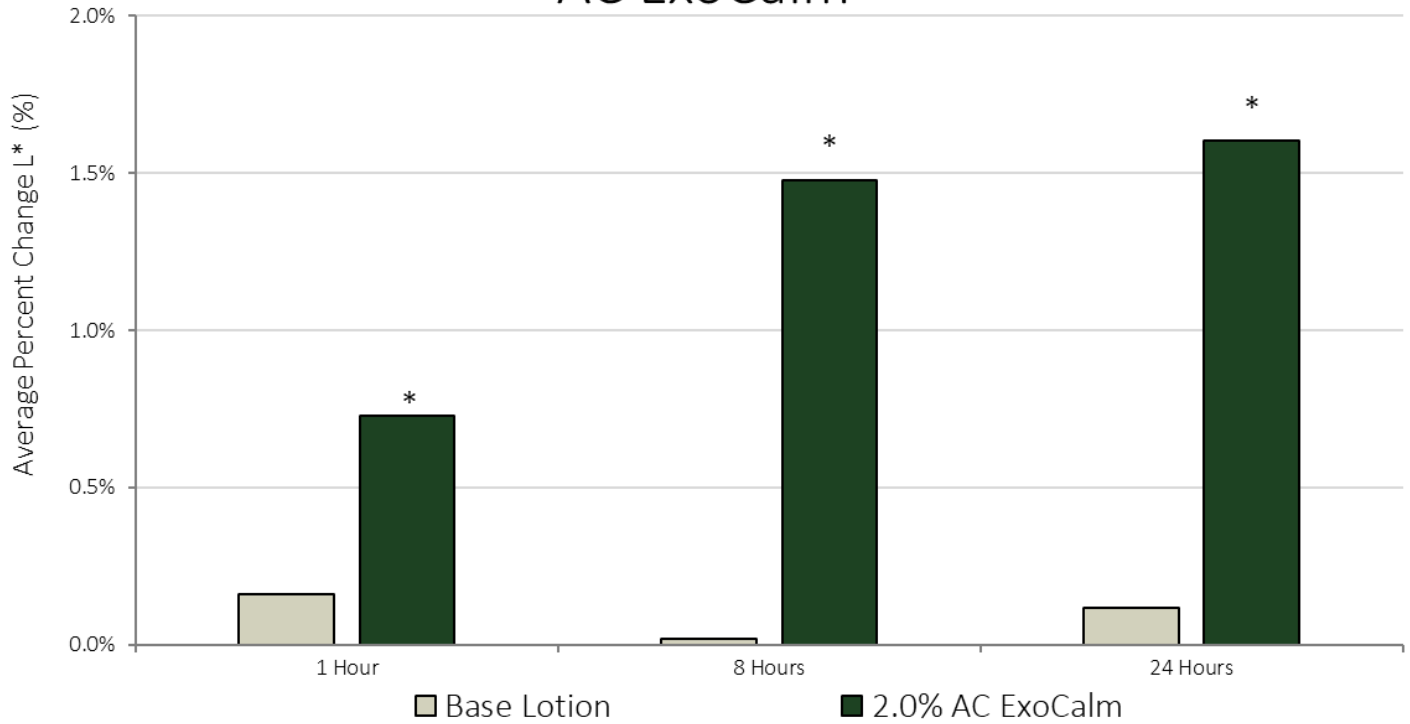
	Untreated Control	Base Lotion	0.4% <i>Glycyrrhiza glabra</i> (Licorice) Root Extract	2.0% AC ExoCalm
Untreated Control	----	0.673	0.632	0.013 <sup>^</sup>
Base Lotion	0.673	----	0.958	0.018 <sup>~</sup>
0.4% <i>Glycyrrhiza glabra</i> (Licorice) Root Extract	0.632	0.958	----	0.017 <sup>&amp;</sup>
2.0% AC ExoCalm	0.013 <sup>^</sup>	0.018 <sup>~</sup>	0.017 <sup>&amp;</sup>	----

## Change in Forearm Brightness AC ExoCalm



**Figure 2.** Percent Change in Forearm Brightness Relative to Baseline Values

## Changes in Overall Face Brightness AC ExoCalm



**Figure 3.** Percent Change in Overall Face Brightness Relative to Baseline Values. \* indicates significance ( $p \leq 0.05$ ) between conditions within the same timepoint.

**Table 6.** T-test Analysis of Face L\* Values 1, 8 and 24 Hours After Application between Base Lotion and 2.0% AC ExoCalm. \* indicates significance ( $p \leq 0.05$ ) between conditions.

	<u>1 Hour:</u> Base Lotion vs. 2.0% AC ExoCalm	<u>8 Hours:</u> Base Lotion vs. 2.0% AC ExoCalm	<u>24 Hours:</u> Base Lotion vs. 2.0% AC ExoCalm
P-value	0.044*	0.021*	0.017*



**Image 1.** VISIA Images of a Participant Over Time (Right Side (R) = 2.0% AC ExoCalm, Left Side (L) = Base Lotion)

### Discussion

The ability of **AC ExoCalm** to enhance skin brightness on both the forearms and face was assessed via L\* values throughout 24 hours with one initial application. As shown in Figure 1 and 2, 2.0% **AC ExoCalm** outperforms the Untreated Control, Base Lotion and 0.4% *Glycyrrhiza glabra* (Licorice) Root Extract in forearm brightness throughout the study. The Untreated Control and Base Lotion performed as anticipated by not significantly altering forearm brightness throughout the study (Figures 1, 2; Table 4). Moreover, 0.4% *Glycyrrhiza glabra* (Licorice) Root Extract augmented forearm brightness throughout the study, but not significantly at any timepoint, compared to baseline (Figures 1, 2; Table 4). Conversely, application of 2.0% **AC ExoCalm** significantly increased forearm brightness by 2.0% and 2.3% eight and 24 hours after product application, respectively (Figure 2). These results demonstrate **AC ExoCalm** has effective immediate and short-term skin brightness properties on the forearms and outperforms the active ingredient, *Glycyrrhiza glabra* (Licorice) Root Extract, alone.

Similar results are shown when examining the collective effect between each condition. There is no difference in forearm brightness between the Untreated Control and Base Lotion one hour after application (Figure 1; Table 5). However, applying 2.0% **AC ExoCalm** significantly increased forearm brightness compared to the Untreated Control, Base Lotion, and 0.4% *Glycyrrhiza glabra* (Licorice) Root Extract after eight hours (Figure 1; Table 5). These results demonstrate **AC ExoCalm** elicits acute brightening properties on the skin with just one application.

Skin brightness on the face was also assessed for 2.0% **AC ExoCalm** and Base Lotion application. As shown in Figure 3, 2.0% **AC ExoCalm** outperformed the Base Lotion in overall face brightness throughout the study. The Base Lotion did not significantly alter overall face brightness, when compared to baseline (Figure 3; Table 6). However, 2.0% **AC ExoCalm** significantly increased overall face brightness by 1.5% and 1.6% eight and 24 hours after product application, respectively (Figure 3; Table 6). Visually, participants experienced an increase in facial brightness one hour after 2.0% **AC ExoCalm** application (Image 1). The results demonstrate **AC ExoCalm** exerts skin brightness properties on the face for a short period of time.

In conclusion, these results indicate **AC ExoCalm** increases skin brightness immediately when added to personal care applications at recommended use levels. Collectively, **AC ExoCalm** demonstrates immediate and short-term skin brightening properties which improves the skin's dull appearance and contributes to 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/>