



In-vivo Skin Lightening Study

info@activeconceptsllc.com • +1 (704)-276-7100 • Fax: +1 (704)-276-7101

Tradename: AC Cinnamon Liposome

Code: 16098

CAS #: 7732-18-5 & 84961-46-6 & 123465-35-0

Test Request Form #: 8863

Lot #: N210503A

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

Study Director: *Maureen Danaher*

Principle Investigator: *Grant Tyler*

Test Performed:

Pigmentation Assay

Introduction

An *in-vivo* study was conducted over a period of 14 days to evaluate the ability of **AC Cinnamon Liposome** to reduce hyperpigmentation. 10 M/F subjects between the ages of 23-45 participated in the study. Results indicate that this material is capable of significantly reducing pigmentation.

The Pigmentation Assay was conducted to assess the pigment reducing effects of **AC Cinnamon Liposome**.

Materials

A. Equipment: DermaLab Skin Combo (Pigmentation Probe)

Methods

The pigmentation module provides information about the skin's pigmentation and erythema levels with measurement based on an active color detecting chip. This measurement of the DermaLab Combo is performed using a handheld probe that accommodates the color sensor, filters, optics, and light source. The light source is composed of two high-intensity white LEDs, as well as a guiding light to illuminate the target during positioning of the probe.

Once the probe is in place, the LEDs flash at full power to illuminate the target area. Pigment levels are measured and recorded as melanin index values.

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10 volunteers M/F between the ages of 23 and 45 and who were known to be free of any skin pathologies participated in this study. The DermaLab pigmentation probe was used to measure the pigmentation levels of the subject's volar forearms. Baseline pigmentation readings were taken on day 1 of the study.

Following initial measurements, all subjects were asked to apply 2 mg of each test material to an area of their forearm twice daily. Measurements were taken immediately after application of test materials and then after 3 days, 8 days, and 14 days. The test material consisted of 2.0% **AC Cinnamon Liposome** in a base lotion.

For added perspective, measurements of an untreated test site and a site treated with a base lotion (Cetaphil Moisturizing for All Skin Types) were recorded.

Results

AC Cinnamon Liposome showed a reduction in pigmentation at a 2.0% concentration. Please note, each value is an average of three consecutive readings per test site.

Percent change in pigmentation is calculated by the following formula:

$$\text{Percent (\%) Change} = \frac{\text{Average Melanin Value}_{T=24 \text{ hours.etc}} - \text{Average Baseline Value}_{T=0}}{\text{Average Baseline Value}_{T=0}} \times 100$$

Averages	T = 0	T = 3 Days	T = 8 Days	T = 14 Days
Experimental (2.0% AC Cinnamon Liposome + Base Lotion)	33.0	32.0	31.2	30.4
Base Lotion	32.6	32.4	33.8	33.8
Untreated	32.2	32.4	32.8	33.0

Table 1. Average melanin index values of individual test sites.

Percent (%) Change	T = 0 vs 3 Days	T = 0 vs 8 Days	T = 0 vs 14 Days
Experimental (2.0% AC Cinnamon Liposome + Base Lotion)	-3.03%	-5.45%	-7.88%
Base Lotion	-0.61%	3.68%	3.68%
Untreated	0.62%	1.86%	2.48%

Table 2. Comparative pigmentation decrease between time points.

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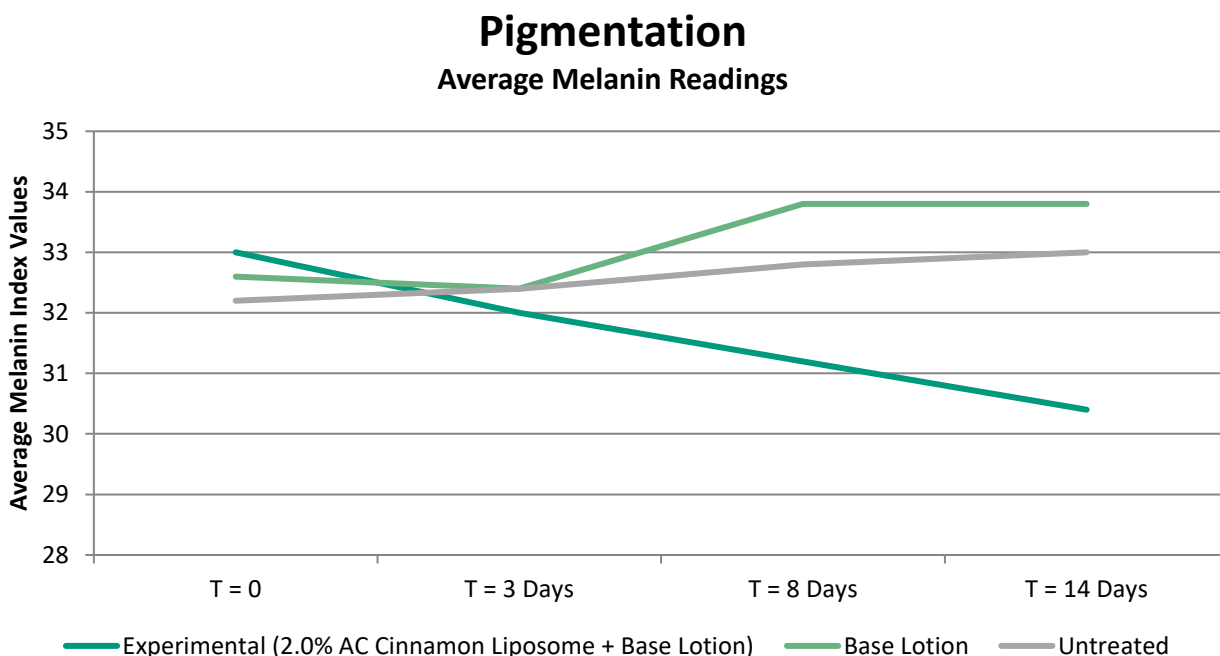


Figure 1. Average decrease in pigmentation.

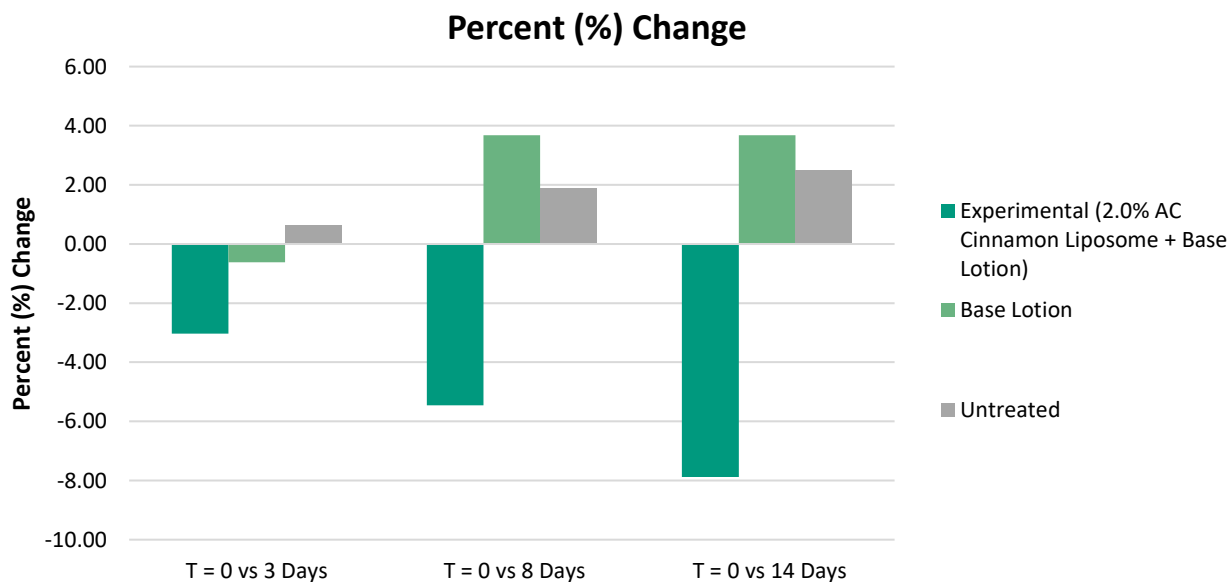


Figure 2. Percent change in pigmentation averages from baseline (T = 0) to each time point of the study (T = 3 Days, T = 8 Days, T = 14 Days).



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Discussion

As evidenced in a 14 day efficacy study of **AC Cinnamon Liposome** on the skin, melanin values decreased by 3.03% after 3 days and 7.88% after 14 days as compared to baseline measurements. The test site that received the base lotion application decreased in pigmentation by 0.61% after 3 days and increased by 3.68% after 14 days. The untreated test site increased by 0.62% and 2.48% after 3 and 14 days, respectively. Results indicate that **AC Cinnamon Liposome** in a lotion formulation is capable of decreasing skin pigmentation to a greater degree when compared to the base lotion and untreated sites alone.

AC Cinnamon Liposome has a lightening effect on skin's pigmentation when used at recommended use levels.