

**Tradename:** AC Sebum Control Enzyme PF

**Code:** 20395PF

**CAS #:** 107-88-0 & 7732-18-5 & 84775-57-5

**Test Request Form #:** 5781

**Lot #:** N191030E

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

**Study Director:** *Maureen Danaher*

**Principal Investigator:** *Kara Rivera*

**Test Performed:**

Sebum Reduction Study

**Introduction**

Sebum is the oily, waxy secretion of sebaceous glands helping to moisturize and protect the skin from bacterial and fungal pathogens. An insufficient amount of sebum can trigger dry, red, and itchy skin whereas an overproduction of sebum leads to oily skin, can block pores resulting in acne, and has a visible shine. The shiny and greasy appearance associated with excess sebum and oily skin is undesirable and reducing these attributes through cosmetic applications is highly sought after.

Accordingly, a sebum reduction study was conducted to evaluate the ability of **AC Sebum Control Enzyme PF** to decrease sebum values on the skin.

**Study Principle**

Initial sebum values were recorded from the forehead, nose, and chin. Following baseline measurements, participants applied a control base lotion to one half of their face and the test article on the other half. After six hours of application, sebum measurements were obtained. The presence of sebum on the skin results in higher readings than sebum lacking skin. Additionally, higher sebum values are indicative of more shine from the skin.

**Materials**

- A. **Equipment:** DermaLab Skin Combo (Sebum Module) with Sebum Collecting Strips
- B. **Base Lotion:** Simple® Mini Hydrating Light Moisturizer
- C. **Software:** Excel Analysis ToolPak (Microsoft)

## Methods

This study was conducted with 4 participants between the ages of 21 and 35, free of any known skin pathologies, with Fitzpatrick skin types I to III (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	

Each participant had half their face randomly assigned as a control side and a test article side, and baseline sebum measurements were obtained. Following baseline measurements, participants applied roughly 75 mg of each treatment to the specified forehead, nose, and chin areas once in a six-hour period. Final sebum measurements were obtained six hours after application of test materials. Participants were also asked to classify their skin type on a scale of 1-10 (extremely dry to extremely oily). The skin test site conditions and treatments are described below (Table 2). The Base Lotion utilized in the study was Cetaphil® Moisturizing Cream for All Skin Types.

**Table 2.** 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	5.0% AC Sebum Control Enzyme PF	5.0% AC Sebum Control Enzyme PF in Base Lotion

The DermaLab Sebum Module analyzed sebum levels on a participant's forehead, nose, and chin utilizing Sebum Collecting Strips. The Sebum Collecting Strips were applied to each test location with equal pressure for 15 seconds. Each test location was measured twice, and an average was recorded. Percent change was calculated by the following formula:

$$\text{Percent Change (\%)} = \frac{\text{Sebum Values}_{\text{After 6 hours}} - \text{Sebum Values}_{\text{Baseline}}}{\text{Sebum Values}_{\text{Baseline}}} \times 100$$

## Results

The data obtained for this study met criteria for a valid study as the Base Lotion performed as expected. However, 5.0% AC Sebum Control Enzyme PF reduced sebum on the forehead, nose, and chin.

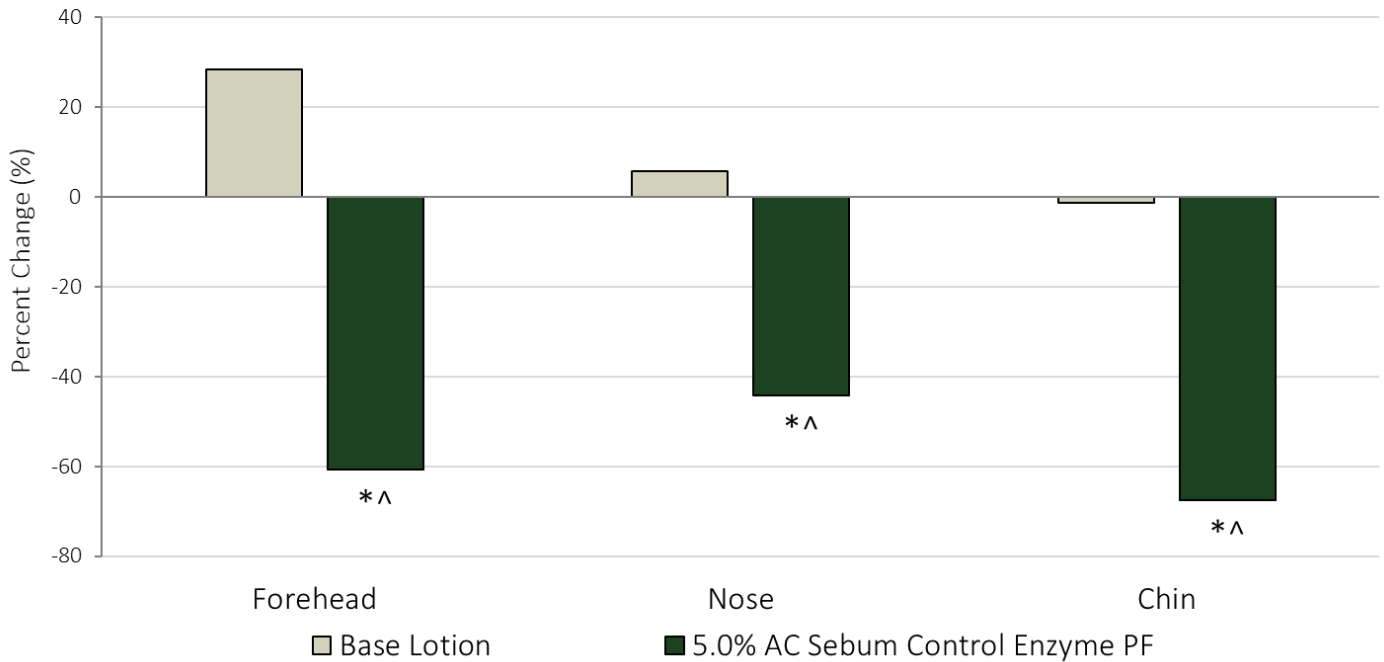
**Table 3.** Self-Assessment of Each Participants (n=4)

	Self-Assessment Rating 1 (very dry) – 10 (very oily)
Average	5.75

**Table 4.** Average Sebum Readings for Individual Test Sites

	Forehead		Nose		Chin	
	Baseline	After 6 hours	Baseline	After 6 hours	Baseline	After 6 hours
Base Lotion	18.5	23.75	21.5	22.75	19.25	19
5.0% AC Sebum Control Enzyme PF	18.5	7.25	21.5	12	19.25	6.25

## Changes in Sebum After 6 Hours AC Sebum Control Enzyme PF

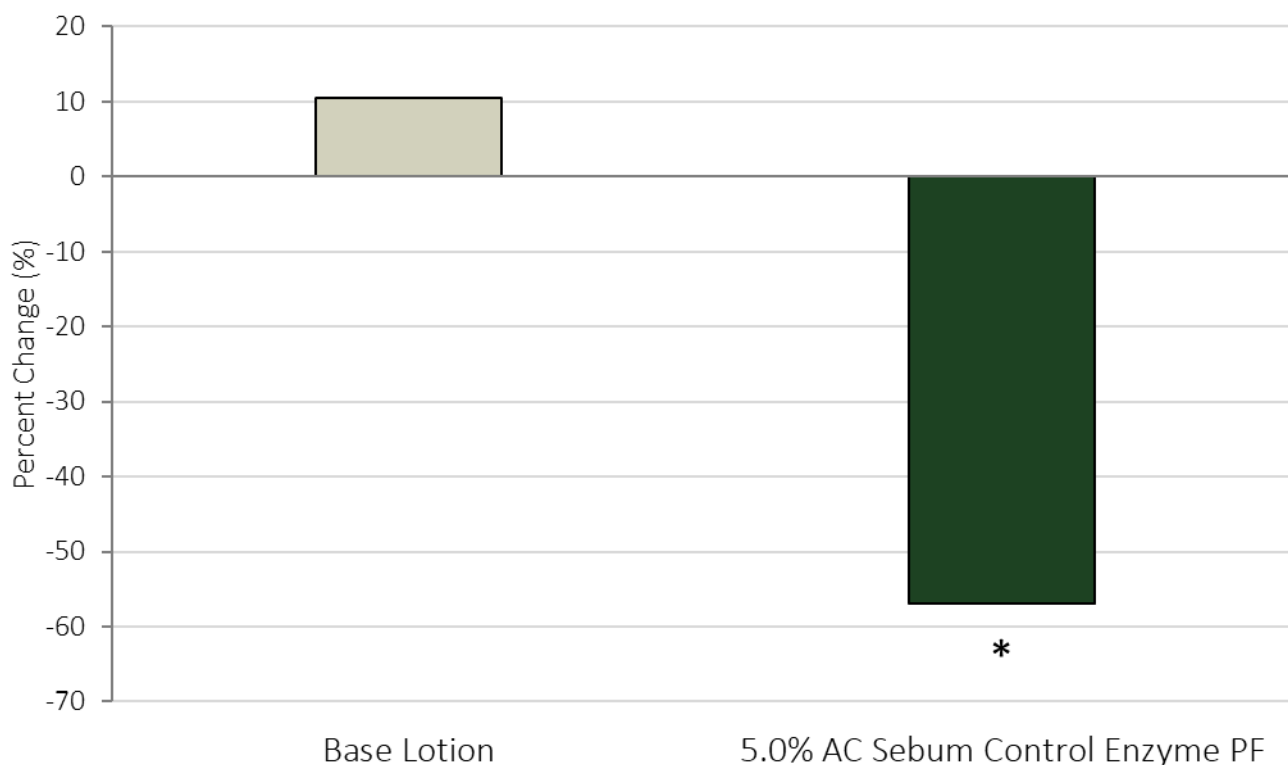


**Figure 1.** Percent Change in Sebum After 6 Hours at Each Test Site. \* indicates significance ( $p \leq 0.05$ ) compared to Baseline within the same condition. ^ indicates significance ( $p \leq 0.05$ ) compared to Base Lotion within the same timepoint.

**Table 5.** P-values of two-tailed T-test Analysis between Base Lotion and 5.0% AC Sebum Control Enzyme PF Sebum values after 6 hours on the Forehead, Nose, and Chin. ^ indicates significance ( $p \leq 0.05$ ) compared to Base Lotion within the same timepoint.

	Forehead	Nose	Chin
P-values	< 0.001^	0.014^	< 0.001^

## Changes in Overall Face Sebum After 6 Hours AC Sebum Control Enzyme PF



**Figure 2.** Percent Change in Sebum After 6 hours for the Overall Face. \* indicates significance ( $p \leq 0.05$ ) compared to Baseline within the same condition.

**Table 6.** Two-tailed T-test Analysis of Percent Change in Overall Face Sebum between Baseline and After 6 Hours of application. \* indicates significance ( $p \leq 0.05$ ) compared to Baseline within the same condition.

	Base Lotion	5.0% AC Sebum Control Enzyme PF
<b>P-values</b>	0.125	< 0.001*

## Discussion

This study was conducted to evaluate the sebum and visible shine reducing properties of **AC Sebum Control Enzyme PF**. Prior to product application participants rated the oiliness of their skin, and on average the participants perceived their skin to be classified as oily rather than dry (Table 3). The Base Lotion increased overall sebum levels by 10% after six hours of application with the forehead and nose increasing by 28% and 6%, respectively, and reducing the sebum present on the chin by 1% (Figures 1, 2; Tables 4, 5). Conversely, 5.0% **AC Sebum Control Enzyme PF** significantly reduced overall sebum levels on the face by 57% after six hours of application, compared to baseline measurements (Figures 1, 2; Tables 4, 5, 6). Specifically, 5.0% **AC Sebum Control Enzyme PF** decreased sebum on the forehead, nose, and chin by 61%, 44%, and 68%, respectively (Figure 1; Tables 4, 5). These results indicate 5.0% **AC Sebum Control Enzyme PF** effectively suppresses excess sebum levels present on the skin after six hours.

In conclusion, these results indicate **AC Sebum Control Enzyme PF** alleviates the undesirable results of sebum overproduction when added to personal care applications at recommended use levels. Collectively, **AC Sebum Control Enzyme PF** acutely suppresses excess sebum present on the face.

## 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/>