

AC Alfalfa Boost

INCI: Medicago Sativa (Alfalfa) Callus Culture Conditioned Media Extract & Lactobacillus Ferment Lysate

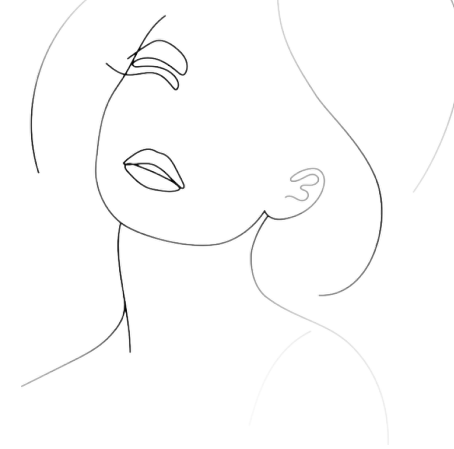


Background

- ❧ For years, scientists have been researching ways to provide an environment to encourage healthy hair **without the use of synthetic chemicals**. Common products contain parabens, formaldehyde, etc.
- ❧ Multiple studies have shown that women and men feel their **confidence stems** from a head full of vibrant, healthy hair.
- ❧ However, what is a **natural**, yet **effective** way to achieve positive results?



Skin-tegrity of the Scalp



- 🌿 The scalp, which is often overlooked, is a **critical foundation** for healthy hair length and thickness.
- 🌿 Products such as scalp scrubs can be used to remove excess oil, buildup, and dandruff, and may even dilate blood vessels which would encourage healthy hair.
- 🌿 However, our scalp also needs to be **replenished** with moisture, antioxidants, and nourishment.

Hair Biology

- ✿ Hair growth occurs in 3 phases: the growth phase (**anagen**), the transitional phase (**catagen**), and the resting phase (**telogen**). Some individuals have shorter anagen phases which can contribute to difficulty growing hair beyond a certain length.
- ✿ Additionally, when consumers experience an imbalance of vitamins, there is a decrease in hair health and the time spent in the anagen phase.
- ✿ However, **sulfur** has been shown to **extend the growth phase** of hair, increase hair strength, and boost elasticity.



Sulfur

Keratin, which makes up about 95% of hair, is rich in sulfur content.

If we are topically applying sulfur onto the scalp and hair follicles, it makes sense that we would see an **increase in hair length and thickness**.

But then... why not just use sulfur products?

Peptides

Peptides are chains of amino acids that give proteins their structure and are able to **penetrate the outer layer of the skin**, rather than just sitting on top.

Utilizing peptide technology, we are increasing the **bioavailability** of this natural sulfur uptake.

Additionally, factors such as inflammation can cause hair follicle and scalp irritation, but **topically applying peptides** soothes these concerns.



Sustainability Stays

Based on sulfur's role in hair growth research, Active Concepts searched for a botanical that is a **natural source** of sulfur that could simultaneously provide the consumer with additional personal care benefits.

Sustainability is no longer something that is "trendy" but rather **necessary** for manufacturers in the personal care industry to be transparent and successful in their sales and business.



Why Alfalfa?



A Confidence Boost That Starts at the Roots

- 🌿 Alfalfa is a plant that has been grown as feed for livestock for hundreds of years, long prioritized for its **superior content** in vitamins, minerals, and protein.
- 🌿 This plant has the remarkable ability to **regenerate** new stems and leaves, and can be harvested in a single growing season.
- 🌿 This botanical **contains more sulfur** than many other crops and is also rich in phytochemicals.

AC Alfalfa Boost

Medicago sativa (alfalfa) is grown in cell culture using sulfur-rich supplemented growth media, and alfalfa callus conditioned media is isolated from the cultures of alfalfa callus cells.

AC AlfalfaBoost is the result of an aqueous extraction, containing a high content of **natural sulfur-rich peptides** that can be used in topical treatments to encourage hair density, nourish the scalp, and provide antioxidant protection.



Alfalfa Extract | *Sulfur-Rich Peptides* | *Hair Health*



Farm Level Sourcing



Our North American supplier in Vermont practices meadowscaping – the procedure of cultivating naturalistic planting to change farms for the better. This allows for a habitat of biodiversity and for native plants to continue to live in harmony.



The alfalfa plant itself has the ability to regenerate new stems and leaves, reducing the need for replanting. Additionally, growing the alfalfa seeds in cell culture minimizes waste and is a sustainable method for energy crop production.



Our second North American supplier in Oregon is family-owned and has the support of the community behind them. They help the farm spread their seeds as they realize the importance of helping one another. We support this Oregon farm, and their community supports them as well.

Benefits

- 🌿 Provide an environment that sprouts and encourages hair length and density with *AC Alfalfa Boost*.
- 🌿 This ingredient not only increases the bioavailability of natural sulfur-rich peptides but also provides scalp benefits, antioxidant protection, and an improvement in eyelash characteristics.
- 🌿 Active Concepts sustainably harnesses alfalfa's high content of nutrients by growing the seeds in cell culture, reducing the energy for crop replantation.



*Suggested Application for
AC Alfalfa Boost*



Hair Thickness

Incorporate AC AlfalfaBoost into hair length and thickness products, such as serums or washes, to encourage and stimulate an environment for longer and thicker hair.



Eyelash / Eyebrow Care

AC AlfalfaBoost can be used in eyelash and eyebrow serums to achieve thicker, fuller eyelashes and eyebrows without the use of eyelash glue and fake eyelashes.



Scalp Protection

The scalp is the foundation of healthy hair, so it also needs nourishment and care. AC AlfalfaBoost can provide such antioxidant benefits when incorporated into scalp care applications.

OTC vs. Cosmetic Claims Can Get a Little "Hairy"



FDA Definitions

FDA defines a cosmetic as:

The FDA defines a cosmetic as a product intended to be applied to the human body for cleansing, beautifying, promoting attractiveness, or altering appearance. Among the products included in this definition are skin moisturizers, perfumes, lipsticks, nail polishes, eye and facial makeup, cleansing shampoos, permanent waves, hair colors, and deodorants.

FDA defines a drug as:

In the US, a product qualifies as a drug when the product's intended use is diagnosing, mitigating, treating, curing or preventing disease, or to affect the structure or function of the body. Drugs must generally receive premarket approval by the FDA through the New Drug Application process or conform to a "monograph" for a particular drug category, as established by FDA's Over-the-Counter (OTC) Drug Review.

Market Insight Examples



Vegamour Gro Serum

- "Reduce signs of shedding for thicker, fuller-looking hair"
- "Formulated for thinner, lackluster hair"
- "Increases appearance of hair density and thickness."



Revitalash® Advanced

- "Enhances and protects eyelashes"
- "Promotes an improved lash appearance"
- "Prevents breakage and brittleness"



Kérastase Resistance

- "Stimulate and protect the scalp for healthy, long hair"
- "Supports healthy hair lengths"
- "Soothing texture"

How to navigate cosmetic claims

[Code of Federal Regulations]
[Title 21, Volume 5]
[CITE: 21CFR310.527]

TITLE 21--FOOD AND DRUGS
CHAPTER I--FOOD AND DRUG ADMINISTRATION
DEPARTMENT OF HEALTH AND HUMAN SERVICES
SUBCHAPTER D - DRUGS FOR HUMAN USE

PART 310 -- NEW DRUGS

Subpart E - Requirements for Specific New Drugs or Devices

Sec. 310.527 Drug products containing active ingredients offered over-the-counter (OTC) for external use as hair growers or for hair loss prevention.

(a) Amino acids, aminobenzoic acid, ascorbic acid, benzoic acid, biotin and all other B-vitamins, dexpanthenol, estradiol and other topical hormones, jojoba oil, lanolin, nucleic acids, polysorbate 20, polysorbate 60, sulfanilamide, sulfur 1 percent on carbon in a fraction of paraffinic hydrocarbons, tetracaine hydrochloride, urea, and wheat germ oil have been marketed as ingredients in OTC drug products for external use as hair growers or for hair loss prevention. There is a lack of adequate data to establish general recognition of the safety and effectiveness of these or any other ingredients intended for OTC external use as a hair grower or for hair loss prevention. Based on evidence currently available, all labeling claims for OTC hair grower and hair loss prevention drug products for external use are either false, misleading, or unsupported by scientific data. Therefore, any OTC drug product for external use containing an ingredient offered for use as a hair grower or for hair loss prevention cannot be considered generally recognized as safe and effective for its intended use.

(b) Any OTC drug product that is labeled, represented, or promoted for external use as a hair grower or for hair loss prevention is regarded as a new drug within the meaning of section 201(p) of the Federal Food, Drug, and Cosmetic Act (the act), for which an approved new drug application under section 505 of the act and part 314 of this chapter is required for marketing. In the absence of an approved new drug application, such product is also misbranded under section 502 of the act.

(c) Clinical investigations designed to obtain evidence that any drug product labeled, represented, or promoted for OTC external use as a hair grower or for hair loss prevention is safe and effective for the purpose intended must comply with the requirements and procedures governing the use of investigational new drugs set forth in part 312 of this chapter.

(d) After January 8, 1990, any such OTC drug product initially introduced or initially delivered for introduction into interstate commerce that is not in compliance with this section is subject to regulatory action.

[54 FR 28777, July 7, 1989]

Point A: list of active ingredients that have been marketed in OTC drug products, but the FDA states that there is inadequate evidence to establish the safety and effectiveness of those actives. ******There are only 2 FDA-approved medical treatments for hair loss: Rogaine (minoxidil) and Propecia (finasteride).**

Point B: Any OTC product that is labeled, represented, or promoted for hair growth or hair loss prevention needs an approved new drug application or it is misbranded.

Point C: Any clinical investigations designed to gain evidence for hair growth or hair loss prevention in a safe and effective manner need to comply with procedures set forth in part 312 of this FDA Chapter.

Point D: Any OTC drug products that are not compliant with this section are subject to regulatory action.

Available Efficacy Studies



In Vitro .

- Hair Shaft Elongation Assay
- IGF-1 ELISA
- ROS

In Vivo .

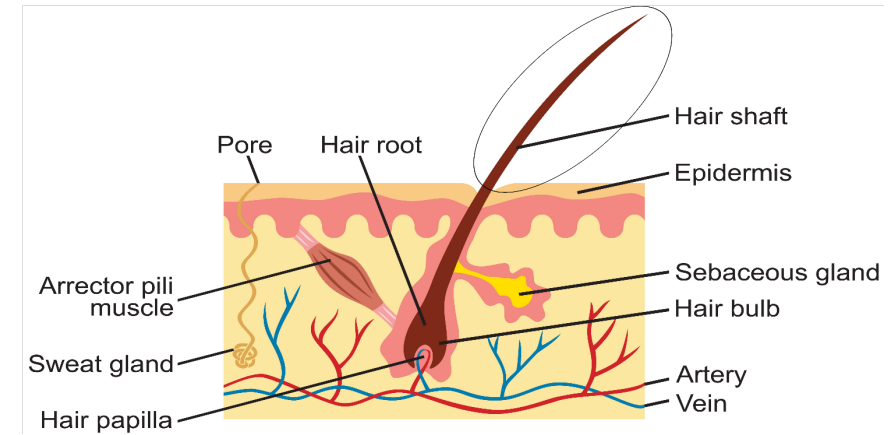
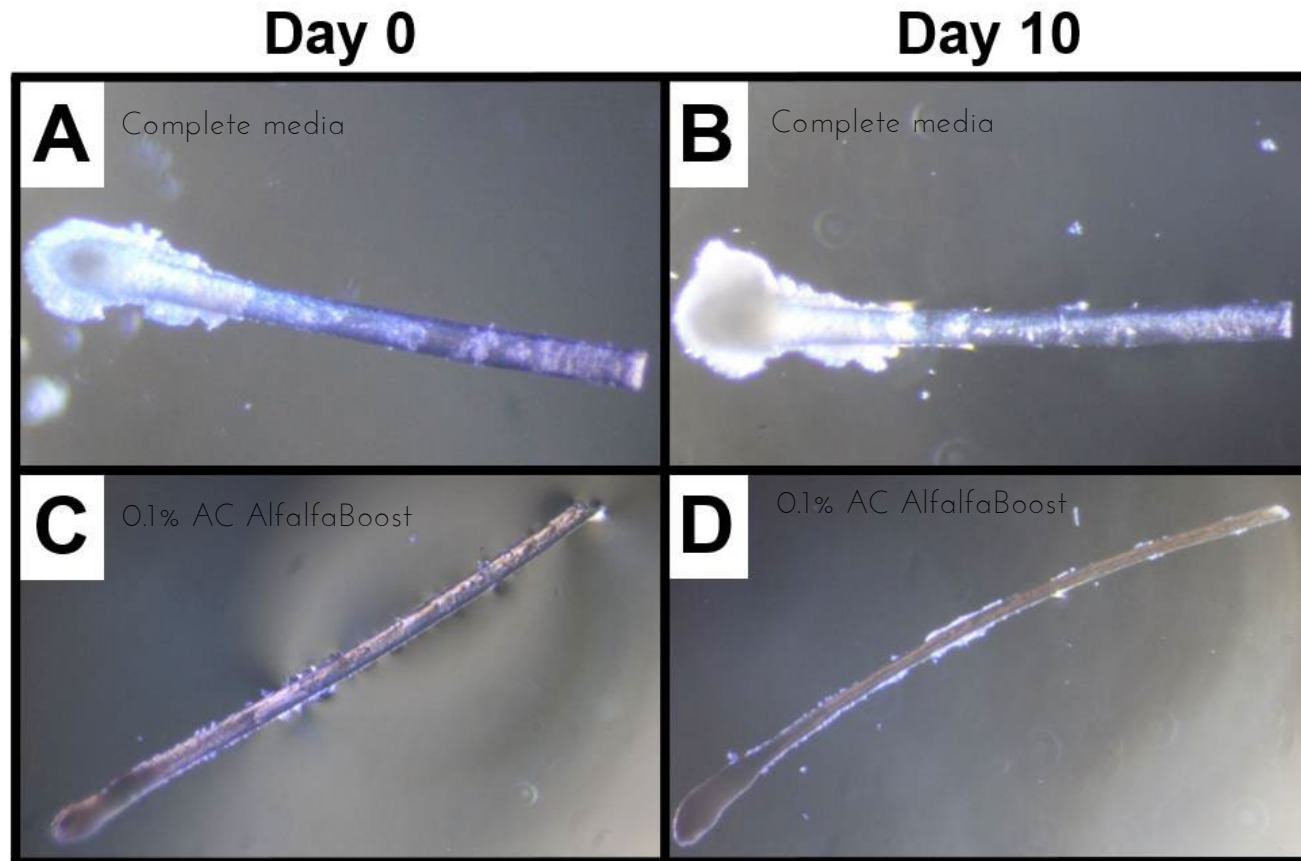
- Eyelash Characteristics
- Scalp Care Study
- Scalp Sebum Reduction

Tox & Safety

- AMES
- Cellular Viability
- Dermal & Ocular Irritation
- Phototoxicity Assay
- OECD 201 Fresh Water Algae Growth Inhibition
- OECD 301B Ready Biodegradability Assay
- OECD TG 442C - Direct Peptide Reactivity Assay
- OECD TG 442D - In Vitro Skin Sensitization Report



Hair Shaft Elongation Assay



Hair consists of a visible structure (the hair shaft) and a component underneath the skin surface (the hair follicle). Hair shafts are thin, keratinized epithelial cells comprising of a central medulla, cortex, and cuticle cells that determine hair's aesthetics and mechanical properties.

Fig 1. Representative images of plucked hair follicles incubated with complete media (A, B) and 0.1% AC AlfalfaBoost (C, D) on Day 0 (A, C) and Day 10 (B, D).

Hair Shaft Elongation Assay Cont.

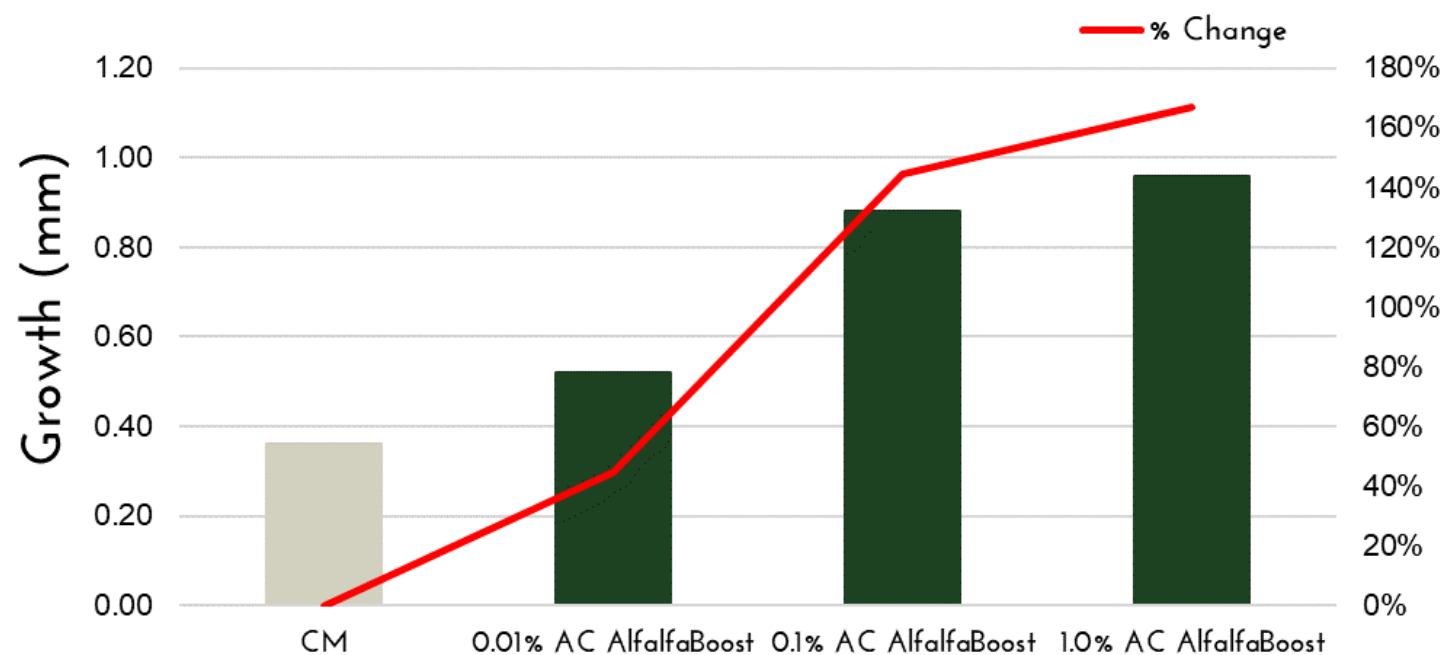


Figure 2. The effect of AC AlfalfaBoost on plucked hair follicle growth after 10 days. Complete media (CM) contains 2 mM L-glutamine, 10 ng/mL Hydrocortisone Hemisuccinate, 10 $\mu\text{g}/\text{mL}$ rh Insulin, 100 Units/mL Penicillin, 100 $\mu\text{g}/\text{mL}$ Streptomycin, and 250 $\mu\text{g}/\text{mL}$ Amphotericin B.

At 0.1%, AC AlfalfaBoost was able to increase hair shaft length of plucked hair follicles *in-vitro* by

Benefits

144%

This is an indicator that since AC AlfalfaBoost increases hair shaft length *in-vitro*, it may promote existing hair length *in-vivo*.

Mechanism: IGF-1 ELISA

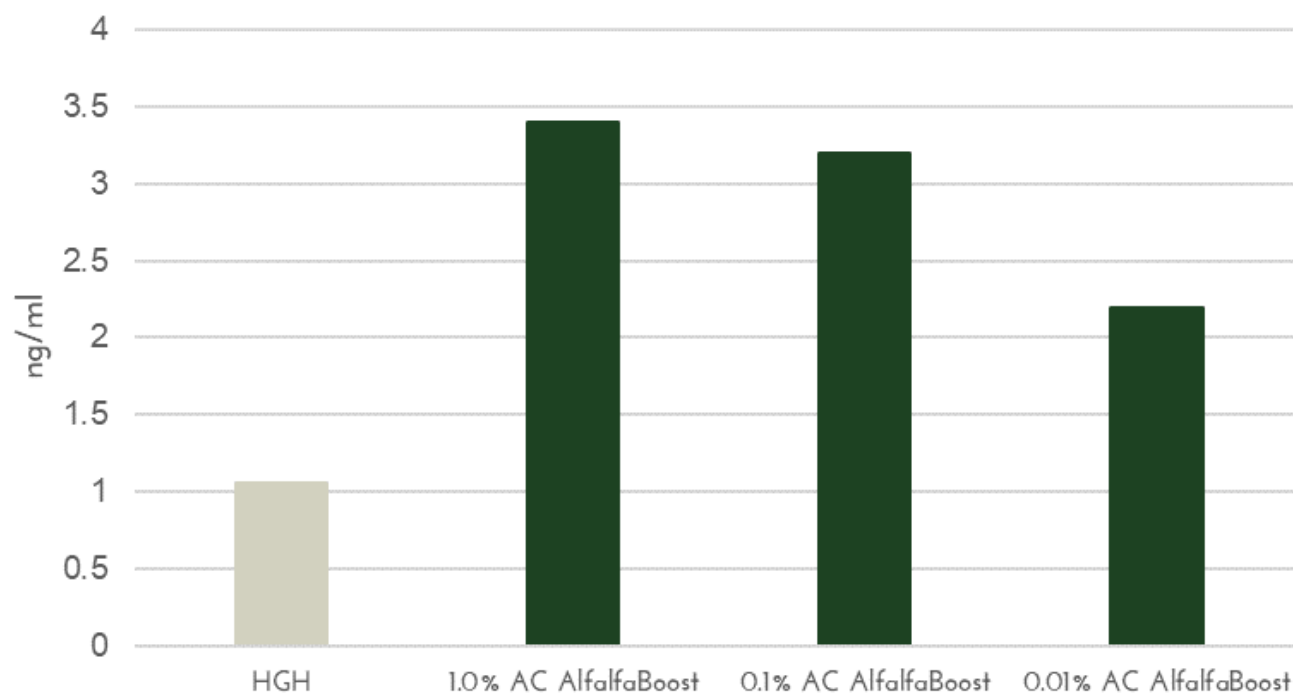
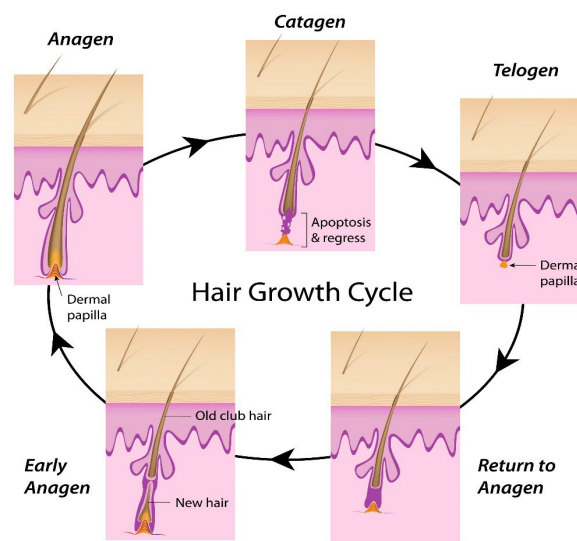


Fig 3. AC AlfalfaBoost - treated dermal papilla cells IGF-1 concentrations and percent change. Human Growth Hormone (HGH) serves as the positive control.



Insulin-Like Growth Factor-1 (IGF-1) is a 70 amino acid polypeptide that plays a large role in mediating the actions of growth hormones. Increasing the concentration of IGF-1 is believed to stimulate the dermal papilla cells and the hair follicle, resulting in follicle elongation.

At 0.1%, AC AlfalfaBoost was able to increase IGF-1 production compared to the positive control by

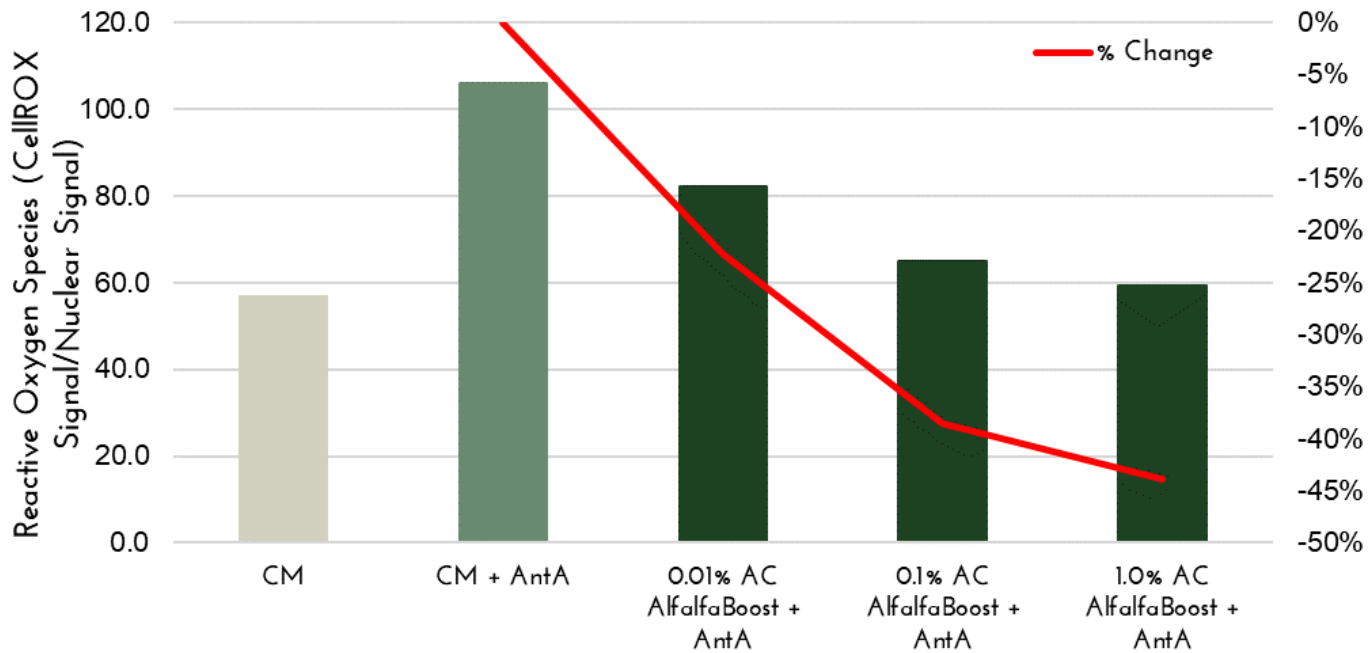
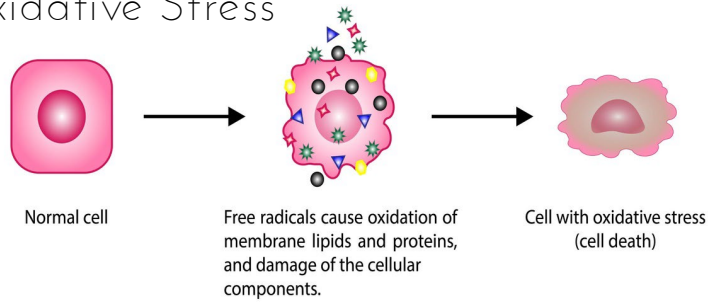
190%

Benefits

AC AlfalfaBoost creates an environment conducive for hair length and thickness, follicle stimulation, and maintenance of the anagen phase.

ROS Assay

Oxidative Stress



Just like our skin, our scalp needs antioxidant protection. UV irradiation, pollutants, foreign substances, and aging elicit unrestricted increases in reactive oxygen species (ROS). Antioxidant benefits would provide scalp cells protection in the blood vessels to promote healthy hair.

Fig 4. The effect of AC AlfalfaBoost on ROS scavenging.

At 0.1%, AC AlfalfaBoost, compared to fibroblasts treated with AntA (a known inducer of oxidative stress) was able to decrease ROS levels by

Benefits

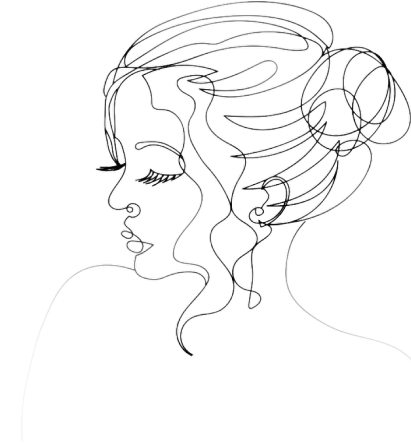
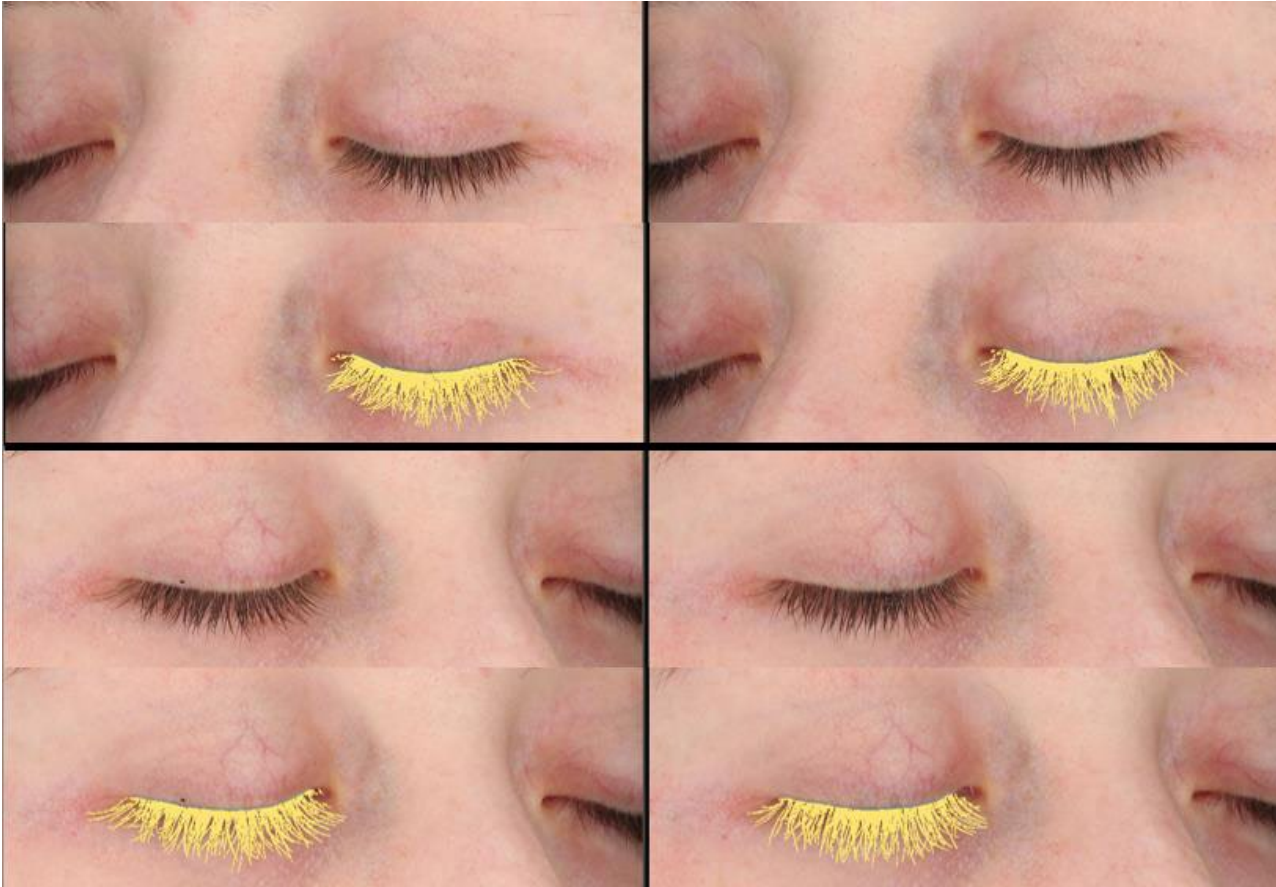
39%

This indicates AC AlfalfaBoost scavenges unnecessary ROS, which may contribute to healthier scalp conditions ideal for healthy hair.

Eyelash Characteristics

Before Treatment/Baseline

8 Weeks, 5.0% AC AlfalfaBoost



Eyelashes also have a growth cycle consisting of the same 3 phases of the hair growth cycle: anagen, catagen, and telogen. However, the anagen phase of eyelashes is a lot shorter than hair. The natural eyelash cycle is 8 weeks.

Image 1: Images of Participant Treated with 5.0% AC AlfalfaBoost in Base Serum with and without VISIA Image Enhancement. Left = Initial, Right = 8 weeks.

Eyelash Characteristics

Overall Average Length (mm)

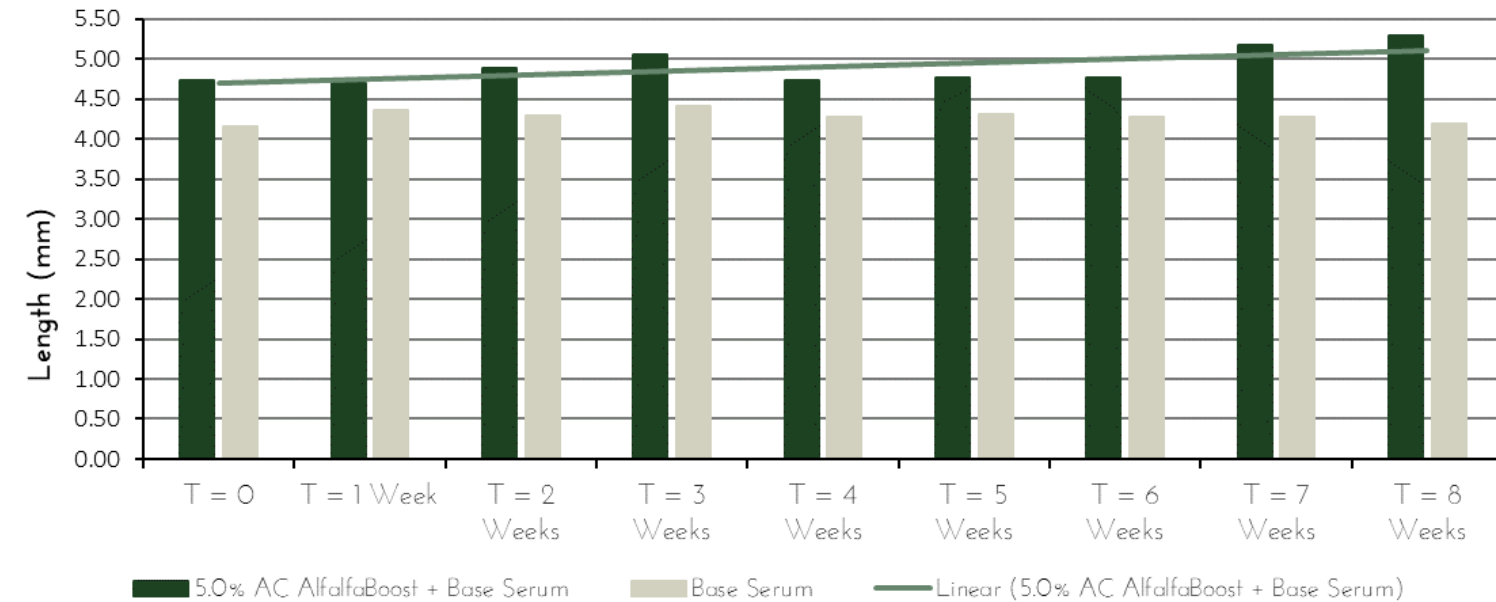


Fig 5. Average Overall Eyelash Length Over Time with Linear Trendline.

10 female participants were instructed to apply a provided eyelash serum to the upper lash-line of both eyes once nightly for an eight-week period. Participants were instructed to not start any new products during the duration of the study. Half used 5.0% AC AlfalfaBoost in a base serum while the other half used the base serum alone as a control.

At 5.0%, AC AlfalfaBoost
increased eyelash fullness
compared to baseline
readings by

Benefits

23%

This confirms AC AlfalfaBoost is
capable of improving eyelash
characteristics such as
eyelash thickness.

Scalp Care Study

Scalp Moisturization Averages

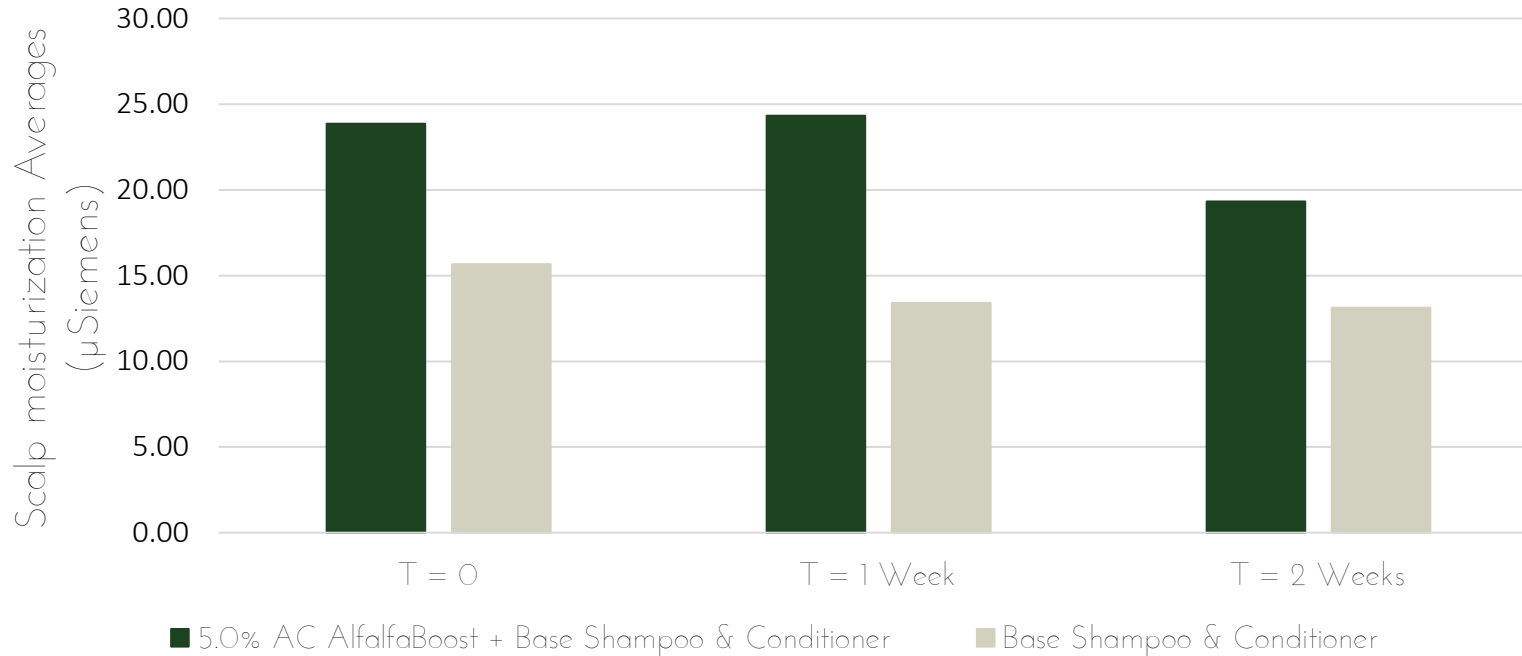


Fig 6. Overall (Front, Middle, Back) Scalp Moisturization Averages at Each Time Point.

An *in vivo* salon study was conducted to determine the scalp care benefits of 5.0% AC AlfalfaBoost in a shampoo and conditioner vs. the control. The study had 20 M/F panelists with pictures taken of the front, middle, and back of their scalps. A DermaLab Corneometer was used to measure the moisture levels of the scalp and the pigmentation measurement of the DermaLab Combo was performed using a handheld probe.

Scalp Care Study

Front

Middle

Back

Initial



2 Weeks, 5.0%
AC AlfalfaBoost

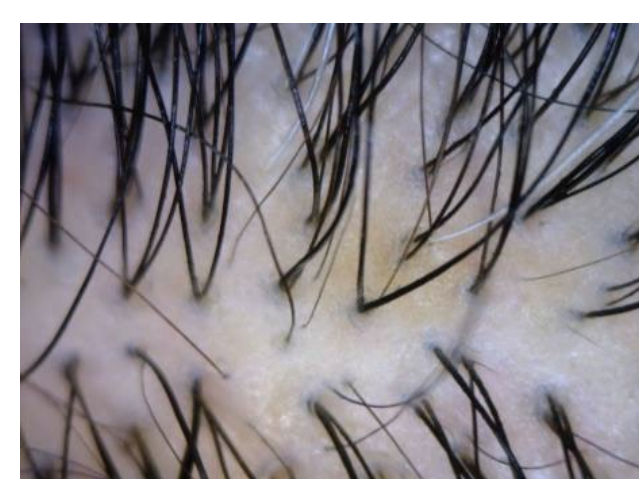


Fig 7. Initial and T=2 Week Images of Participant 4 Using Experimental Product Containing 5.0% AC AlfalfaBoost. Note the redness reduction from the top row pictures to the bottom row pictures.

AC AlfalfaBoost used at 5.0% was able to increase scalp moisturization and reduce scalp erythema compared to the base controls by

Benefits

19%
& 18%

AC AlfalfaBoost is able to provide the scalp with benefits such as moisturization and redness reduction.

Scalp Sebum Reduction

Scalp Sebum Presence AC AlfalfaBoost

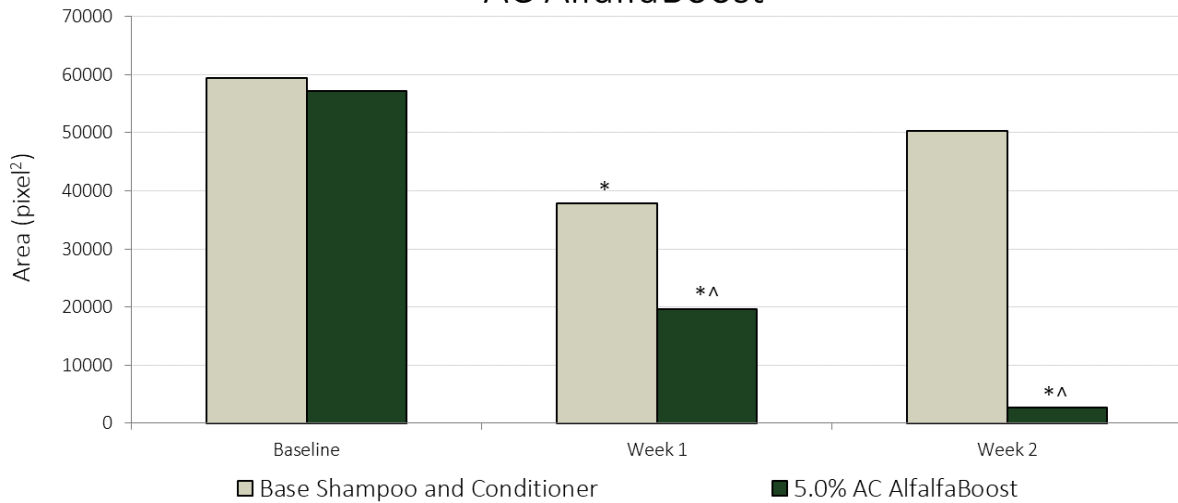


Fig 7. Scalp Sebum Overtime. * Indicates Significant ($p \leq 0.05$) compared to Baseline Within the Same Condition. ^ Indicates Significance Between Conditions at Given Timepoint ($p \leq 0.05$).

Scalp Hydration AC AlfalfaBoost

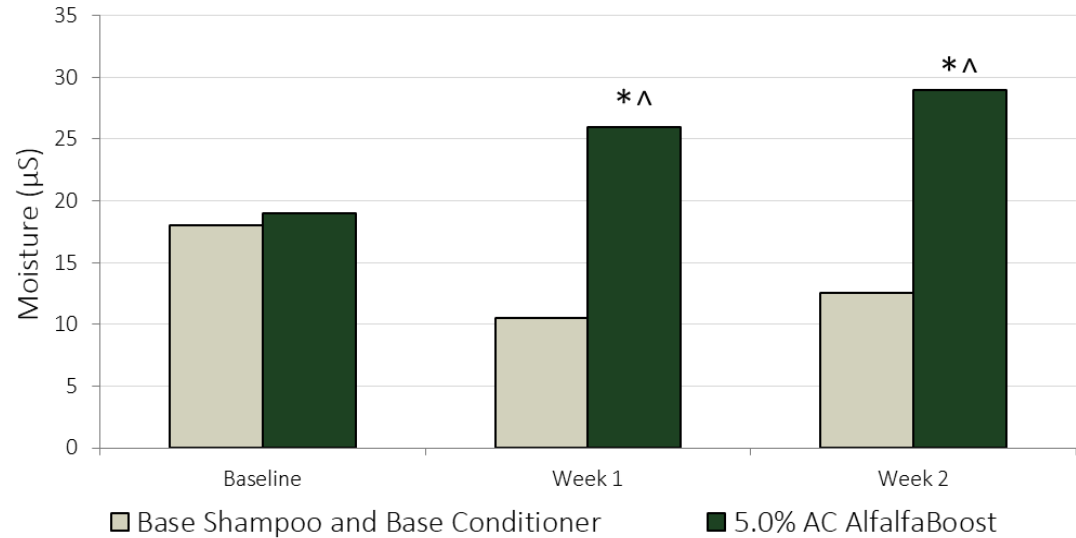
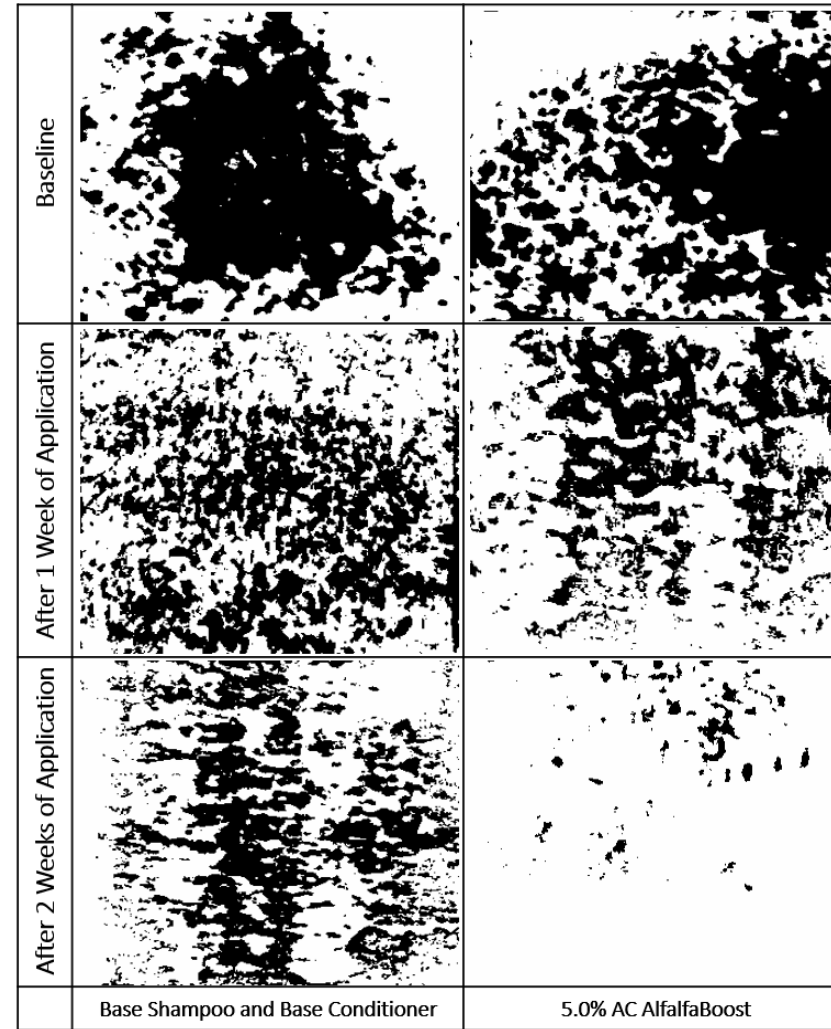
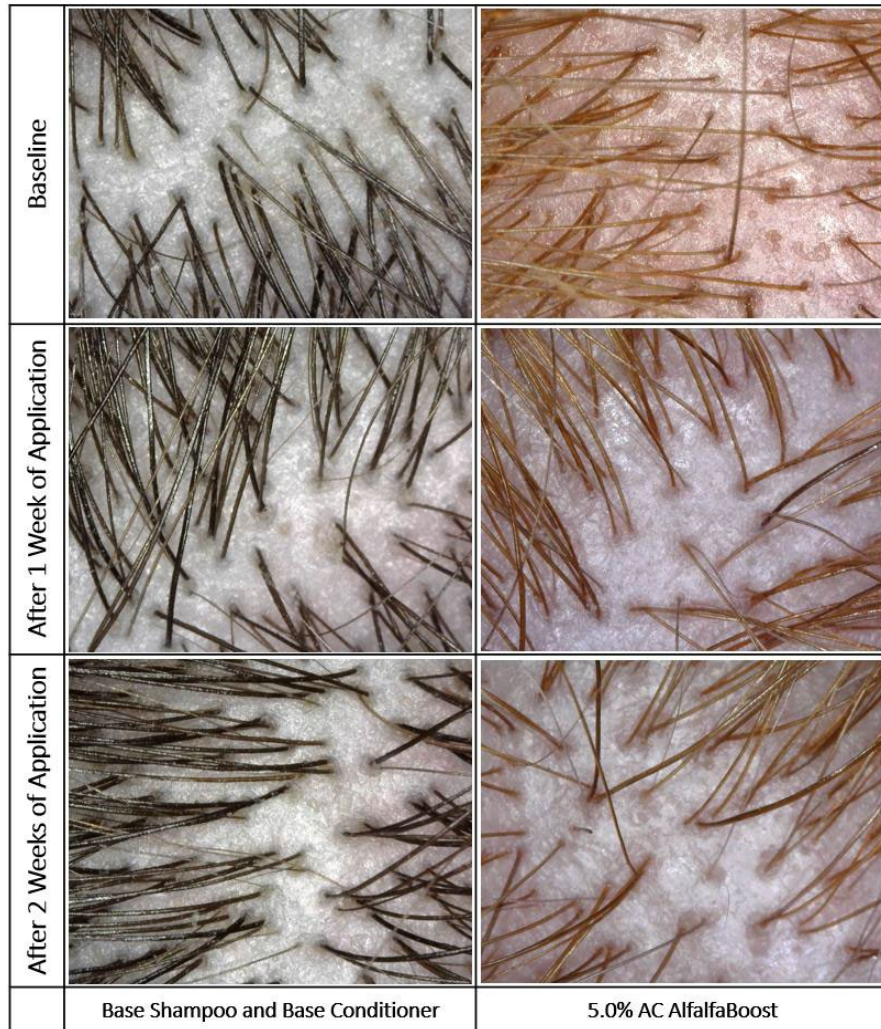


Fig 8. Scalp Hydration Overtime. * Indicates Significant ($p \leq 0.05$) compared to Baseline Within the Same Condition. ^ Indicates Significance Between Conditions at Given Timepoint ($p \leq 0.05$).

Five female participants who were free of any skin pathologies volunteered for this study. Each panelist had a baseline photo taken of their scalp prior to product application with a DermaScope Camera Probe and again after one and two weeks of product application. Participants were blindly treated with either the Base Shampoo and Conditioner or the test product containing 5.0% AC AlfalfaBoost. Sebufix® SF16 foils were used to measure the sebum content on participant's scalp. Scalp hydration was also measured to ensure that while this product is decreasing sebum, it is not drying out the scalp either.

Scalp Sebum Reduction



Representative Images of Sebufix® SF16 Foils Indicating Sebum Present on Participant's Scalps Overtime. Dark spots represent sebum content. Skin with lower sebum content shows few small spots, whereas oily skin is displayed by a great number of large spots.

5.0% AC AlfalfaBoost was able to decrease scalp sebum and increase scalp hydration after 2 weeks compared to baseline measurements by

Benefits

-95%
& +53%

AC AlfalfaBoost is able to decrease scalp sebum without drying out the scalp.

Summary



WHAT.

Topical application of natural sulfur-rich peptides derived from alfalfa stimulates an environment primed for enhanced hair thickness and scalp protection.

WHY.

AC AlfalfaBoost increases the amount of IGF-1, a polypeptide that plays a large role in mediating the actions of growth hormones and has the power to scavenge unnecessary ROS levels.

MADE OF

AC AlfalfaBoost is extracted from alfalfa cell culture and is comprised of sulfur-rich peptides and amino acids.

ACTION.

AC AlfalfaBoost is a botanically derived ingredient that encourages hair density, scalp care, and antioxidant protection.



AC Alfalfa Boost

Code: 20988, 20988CHI*

INCI: Medicago Sativa (Alfalfa) Callus Culture Conditioned Media
Extract & Lactobacillus Ferment Lysate

Appearance: Clear to Slightly Hazy Liquid, Colorless to Pale Amber

Suggested Use Level: 1-10%

Suggested Applications: Hair Growth, Scalp Care, Antioxidant

Standardization: Sulfur: 3.5 - 3.7% | Peptides: present



In Vitro



In Vivo



ISO 16128
NI & NOI



Vegan
Compliant



COSMOS
Compliant



Product
Passport

*China subcode available

References

1. Sahota, Tarlok Singh. "Understanding Alfalfa Nutrition." *Thunder Bay Agricultural Research Station. Northwest Link* (2007).
2. Thomas, Moyer D., Russel H. Hendricks, and Geo R. Hill. "Sulfur metabolism in alfalfa." *Soil Science* 70.1 (1950): 19-26.
3. Alexandrescu, Doru T., C. Lisa Kauffman, and Constantin A. Dasanu. "The cutaneous epidermal growth factor network: Can it be translated clinically to stimulate hair growth?." *Dermatology online journal* 15.3 (2009).
4. Montagna, William, and Richard A. Ellis, eds. *The biology of hair growth*. Elsevier, 2013.
5. Blume-Peytavi, Ulrike, David A. Whiting, and Ralph M. Trüeb, eds. *Hair growth and disorders*. Springer Science & Business Media, 2008.
6. Scott, E. J. V. "Keratinization and hair growth." *Annual Review of Medicine* 19.1 (1968): 337-350.
7. <https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?fr=310.527>
8. Shimomura, Yutaka, et al. "Polymorphisms in the human high sulfur hair keratin-associated protein 1, KAP1, gene family." *Journal of Biological Chemistry* 277.47 (2002): 45493-45501.
9. Westgate, Gillian E., Natalia V. Botchkareva, and Desmond J. Tobin. "The biology of hair diversity." *International journal of cosmetic science* 35.4 (2013): 329-336.
10. Egleton, Richard D., and Thomas P. Davis. "Bioavailability and transport of peptides and peptide drugs into the brain." *Peptides* 18.9 (1997): 1431-1439.

Active Concepts



Social: @activeconceptsglobal

Website: www.activeconceptsllc.com

Email: info@activeconceptsllc.com