

Vital Hair & Scalp Complex

Anti-Aging Active for Healthy Hair



INCI Name: Water & *Saccharum officinarum* (Sugar Cane) Extract & *Citrus limon* (Lemon) Fruit Extract & Betaine & Hexylene Glycol & *Pyrus malus* (Apple) Fruit Extract & *Camellia sinensis* Leaf Extract & Hexapeptide-11
SAP Code#: 137730

Key Product Attributes:

- Addresses hair and scalp aging at cellular level
- Improves health of follicle
- Reduction in hair fall
- Anti-oxidant activity
- Increases penetration of actives to follicle

Use Level

1 – 5%

Background Information

The hair that decorates the top of most people's heads is essentially a non-living entity that is comprised principally of keratin protein fibers embedded in an aqueous protein matrix.^{1,2} Yet, given that the visible portion of the hair is non-living, humans spend an inordinate amount of time modifying their hair fibers to support their social image. It is well known that as people age, their hair begins to thin as a result of hair loss and reduction in the active growing cycle, or anagen phase of hair growth. The subcutaneous fat layer of the scalp also thins and hair becomes more brittle. The ability of the hair cortex to absorb melanin begins to diminish and the hair starts to lose its youthful color and shine.

What most people do not typically realize is that much like their fingernails which are also non-living entities comprised of keratin, the hair grows from a vital portion of the skin called the follicle. Unlike the hair fiber that is visible, the portion of the hair that resides below the scalp, in the follicle, is a beehive of cellular activity and life. The hair fiber originates at a terminal point called the hair bulb where living dermal papilla cells, close cousins to normal human dermal keratinocytes, grow, divide and absorb melanin. In fact, the hair fiber is quite alive throughout the entire length of the hair follicle. This leads to the possibility that topical treatment of the scalp hair with products designed to penetrate the oily (sebum) layers of the follicle should be able to deliver benefits to the growing hair.

It seems reasonable to expect that if follicular health is improved or maintained, it would provide a direct correlation to healthier, thicker, younger hair. To address this possibility, Lonza is pleased to offer Vital Hair & Scalp Complex.

Components of Vital Hair & Scalp Complex

Hexapeptide-11 is a biofermented peptide that has been shown in *in vitro* genomic studies, run on human dermal fibroblasts, to upregulate key genes responsible for collagen production and important extracellular matrix components such as hyaluronic acid. In a gene microarray study conducted on human dermal fibroblasts, it was found that topical treatment with Hexapeptide-11 was able to upregulate the Androgen Receptor gene [AR] indicating that the peptide appears capable of binding to the Androgen Receptor much the way testosterone will. This suggests that Hexapeptide-11 may be able to influence the principal biochemical pathways responsible for converting young velus hair into mature terminal hair. In addition, Hexapeptide-11 has also been shown to improve skin elasticity *in vivo* suggesting that it can function to improve the skin's underlying matrix proteins such as collagen and elastin. All of these functions are important for improving scalp and follicle health.

Sugar-beet betaine (trimethylglycine) has been shown *in vitro* to stimulate the production of collagen in human dermal fibroblasts. Improving the production of collagen in the skin helps to strengthen the extracellular matrix where the hair bulb principally resides. Betaine is also known to be part of the important cascades for cellular production of ATP, the energy molecule of every living cell. Enhancing the energy cascades of the hair bulb improves the ability of the hair to function during the anagen or growth cycle of the hair fiber.

Fruit extracts isolated from sugar cane, lemon and apple offer natural exfoliating action through the action of a-hydroxy acids promoting cell renewal on the scalp. This helps clear the follicles of excessive build up of dead cells, allowing more room for thicker hair growth. In addition, the natural pH of the scalp is slightly acidic, so the acidic nature of Vital Hair & Scalp Complex, ensures that hair proteins are kept hard and more resistant to breakage.

Green tea extracts which are known to contain important and beneficial isoflavones protect the scalp from both oxidative stresses and UV radiation and have well-documented soothing benefits for skin.

In Vivo Half-Head Study Topical Hair Follicle Strengthening

To examine the ability of Vital Hair & Scalp Complex to improve hair follicle integrity, an *in vivo* half-head panel study was conducted consisting of 3 different evaluations. The first was a subjective evaluation of the hair after a 5 day in-use study. The second part of the evaluation was the actual hair combing study, which was followed by a final evaluation consisting of scanning electron micrographs offering a comparative analysis of hair removed from the head via the combing study.

The panel consisted of 15 informed volunteers between the ages of 30 to 60. The participants were required to have hair at least 12 inches long or longer and they were unaware which side of the head received the vehicle and which side received the vehicle containing the Vital Hair & Scalp Complex. After a short three day washout to remove residual conditioners, the participants were shampooed once a day at a salon using a standard commercial shampoo that did not contain conditioners. They were then treated with a commercial conditioner on one side of the head (vehicle) and the same conditioner with 5% of Vital Hair & Scalp Complex (Vehicle + Test) once a day for five days. The conditioner was allowed to stay on the scalp for 5 minutes prior to rinsing. After rinsing, the panelist's shoulders were covered with a white cloth to collect any potential hairs that might fall out during wet combing. The wet hair was then brushed and blown dry for a period of 3 minutes. During the blow drying process, all the hairs that were either lost on the brush or were found on the white cloth were collected. The total number of hairs lost from each side of the head was counted and special attention was paid to the ones that had pulled out of the head with the hair bulb intact, as these were characteristic of true follicle weakness. Collecting and sorting was done at two time points, at Day 0 (Baseline) and at Day 5 after treatment.

In addition, at the end of the 5-day test period, each panelist was asked a series of subjective questions about each side of their head including questions directed towards the appearance, feel and strength of their hair.

Consumer Perception Questionnaire

The subjective questionnaire consisted of a series of questions to address the appearance, feel and strength of their hair following the 5 day study. The results showed that the participants overwhelmingly indicated the side of the head treated with Vital Hair & Scalp Complex was softer (87%) and stronger than before treatment, along with 66% of panelists noting smoother hair following treatment with this complex.

Examining the combing study data comparing the treated verses untreated sides of the head as shown in Figure 1, the side treated with Vital Hair & Scalp Complex indicates a 17% improvement in just five days as indicated by the reduction in hair. Further statistical significance would certainly have been obtained using a longer treatment time.

Evaluation of Vital Hair & Scalp Complex Ability to Strengthen Hair Follicles

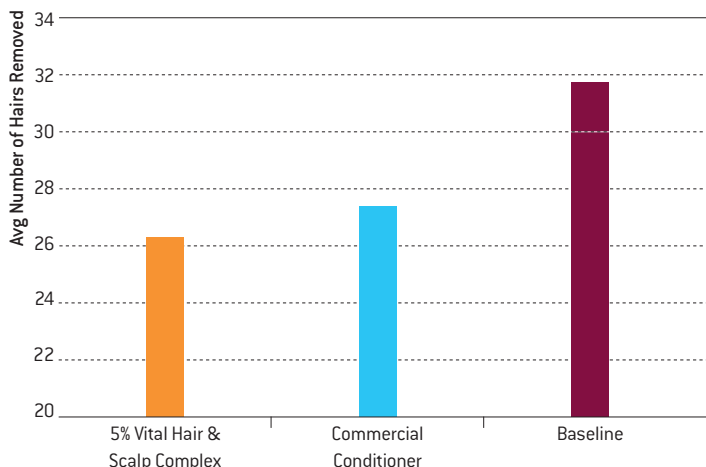


Fig. 1
In Vivo 5 day efficacy study to evaluate topical hair follicle strengthening/hair loss/ hair retention

SEM Comparative Analysis

When examining a random sampling of hairs from both sides of the head using scanning electron microscopy (SEM), a striking difference in the appearance of the hair fiber bulbs was commonly seen. The hair bulb shown in Figure 2 was typical of those seen from hair treated with the Vital Hair & Scalp Complex, noticeably larger and smoother. The fiber bulb shown in Figure 2 was typical of those seen on the vehicle treated side, somewhat smaller and less uniform. The scale at the bottom of the photomicrographs indicates that each picture is the same size and yet the difference in the size of the hair bulb from the treated hair is striking compared to the vehicle treated hair bulb. Again in just 5 days we are seeing initial improvements in the state of the hair bulbs, as a positive effect of the hair conditioned with the product containing the Vital Hair & Scalp Complex.

The reasons for these profound visible differences are not precisely known. It is possible that the Vital Hair & Scalp Complex is better able to deliver important moisture binding ingredients to the lower portion of the hair shaft and to the bulb. Or, it is possible that Vital Hair & Scalp Complex was able to enhance or lengthen the duration and number of hairs that are in the anagen (active growth phase) period when the hair bulbs are known to be at their strongest and most robust state. Perhaps both effects are happening together.

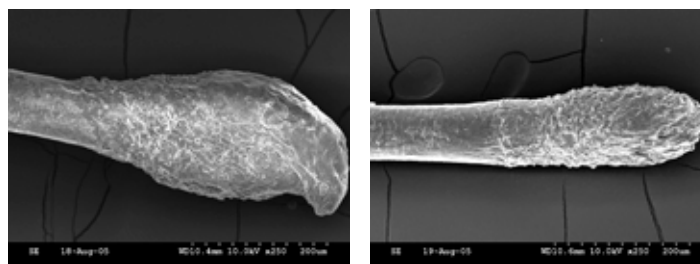


Fig. 2
Hair follicle on left is representative of typical hair removed from the test formulation containing 5% Vital Hair & Scalp Complex. Hair follicle on the right is representative of hair loss from the control formulation

Conclusion

Hair, like skin, is prone to both genetically programmed chronological aging as well as extrinsic aging. The overall appearance of healthy, youthful looking hair results from not just the hair itself but also the condition of a person's scalp. Vital Hair & Scalp Complex addresses many of the aspects of aging hair and scalp and has demonstrated efficacy in as little as 5 days.

The combination of alpha hydroxy acids promoting cell renewal on the scalp; keeping follicles clear and open allows for healthier hair growth. As shown by the SEM photomicrographs of the hair lost from the test formulation compared to the control, keeping follicles open for growth results in larger hair roots. On a cellular level, the follicles are energized by trimethylglycine while a naturally derived peptide enhances the anchoring function of the follicle. Together with the protective qualities from the antioxidants present in Vital Hair & Scalp Complex, smoother feeling, stronger hair will be achieved.

Typical Properties	
Appearance	Clear colorless liquid
Odor	Characteristic
Non-Volatile Matter (1g/1hr/105°C)	16 - 22%
pH (at 25°C)	2.6 - 3.6
Microbial Content	500 opg maximum, No pathogens
Preservative System	0.15 - 0.20% Phenoxyethanol
Recommended Use Level	1.0 - 5.0%
Safely Profile (Testing done at 100%)	
Ocular Irritation	Moderate
Dermal Irritation	Non irritant
RIPT	Non sensitizing



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References

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