



# Hair Care from Scalp to Tip

April 2025

dsm-firmenich ●●●

# Agenda

01 Market & Consumer Insights

02 dsm-firmenich Hair Care Solutions Map

03 ALPAFLOR® EDELWEISS CB

04 PENTAVITIN®

05 BeauPlex® VH

06 Other dsm-firmenich Solutions



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# 01

# Agenda

01 Market & Consumer Insights

02 dsm-firmenich Hair Care Solutions Map

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# The Hair Care Market

2nd biggest segment within Personal Care, accounting for 15% of the whole market

61% of the sales is behind Shampoo, Conditioners & Treatments

Top 20 Global Companies account for 45% of the market

APAC is the biggest region, accounting for 31% of whole sales, followed by EMEA with 30% of the sales

Source: Euromonitor Global RSP MKT Val, FY 2020

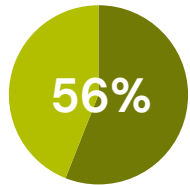


# What's really trending now?

Hair Loss\* Treatments, Conditioners and Treatments, are the fastest-growing segments

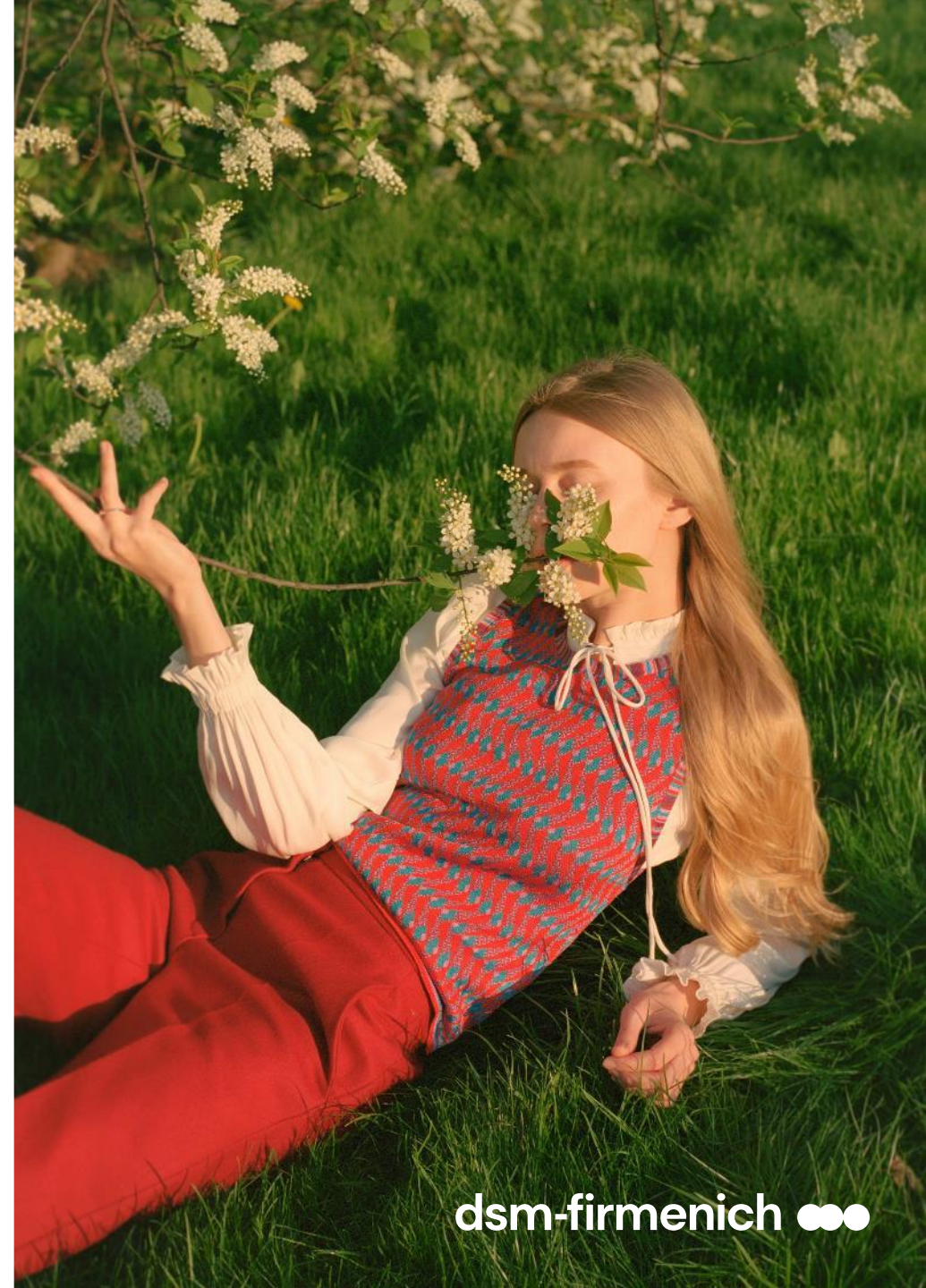
Premium segment is growing more than 3.5x above the Mass segment

Skinification continues to be a key trend: Consumers are interested in ingredients trending in facial skincare



Of Consumers, when it comes to purchasing decision, the active ingredient is more important than the brand, packaging and fragrance

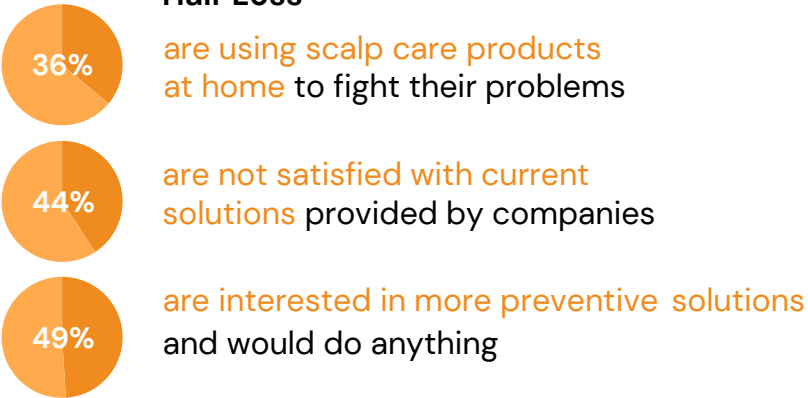
\*Helps prevent hair loss / Drug claim in some regions  
Source: Mintel, dsm-firmenich | Research 2021



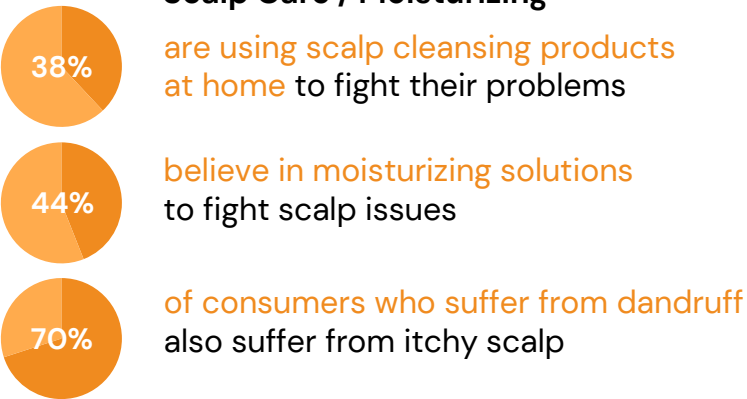
# Fastest Growing Benefits & Consumer Intel

Scalp is a growing focus with moisturizing, sensitive scalp, damaged hair, and hair loss\* as main claims

## Hair Loss\*



## Scalp Care / Moisturizing

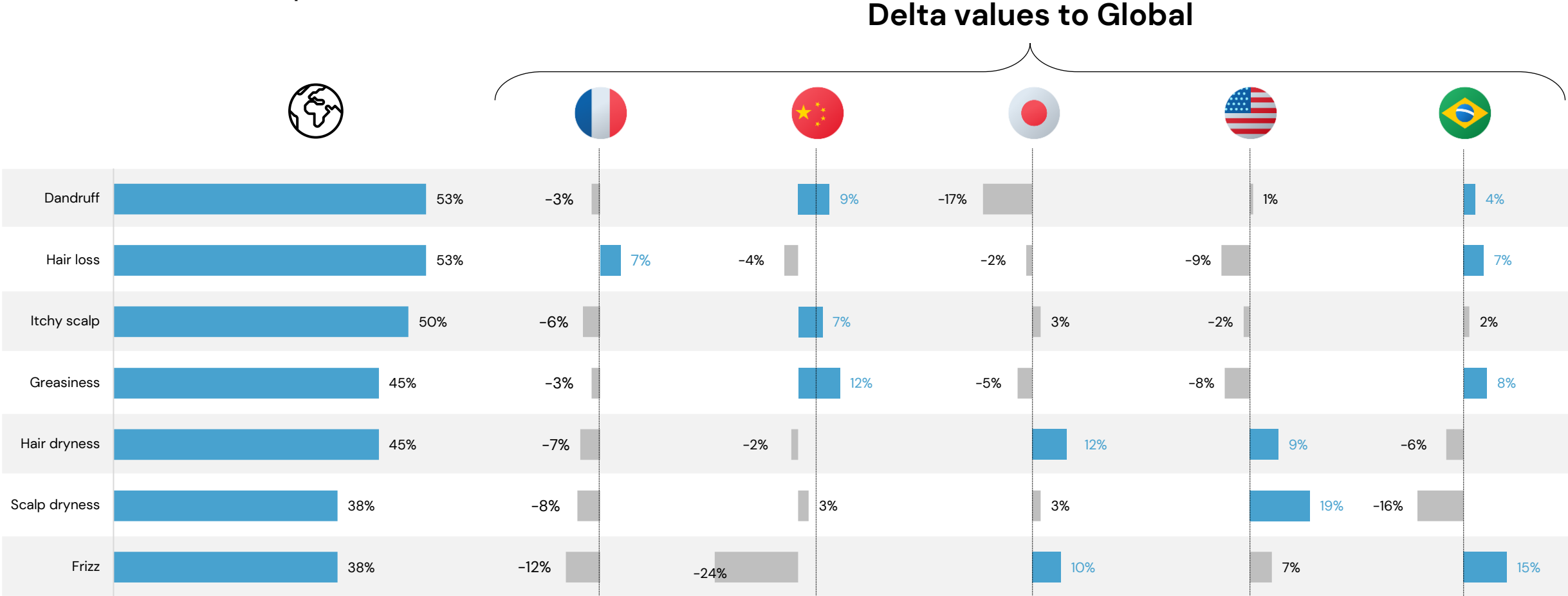


\*Helps prevent hair loss / Drug claim in some regions  
Source: Mintel, dsm-firmenich Research 2021



# Top of mind concerns across the Globe

Quite differentiated picture across the countries



\*Q2: Multiple choice. Total number of respondents: 2100. Countries weighted data  
Consumers already suffering the issue

# Skinification Messaging

## Brands are educating consumers

Hair Care brands are messaging the connection between a **healthy scalp and hair loss\*** with mentions on **social media increasing tenfold from 2019 to 2020**.

Brands are also trying to **educate consumers about managing health as a hair loss\* strategy** but also suggesting multiple products as a possible solution to help combat the issue.

Act+  
Acre



### Skincare for your Scalp – The Essentials:

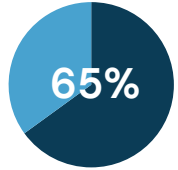
- Scalp Detox: A treatment that rebalances the moisture barrier to **support the scalp's** vital role in healthy hair
- Hair Cleanse: A nutrient-dense shampoo that **gently removes residue without irritation**
- Hair Conditioner: A silicone-free conditioner made of plant oils that instantly absorb to **deliver weightless, lasting hydration**

\*Helps prevent hair loss / Drug claim in some regions  
Source: Mintel



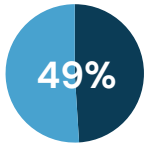
# Hair Loss\*

## 2020 Survey insights

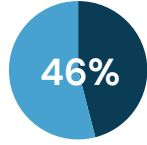


of people with hair loss problems think the #1 cause is stress/depression

### Biggest Symptoms for Hair Loss:

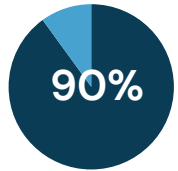


Hair Loss in the shower



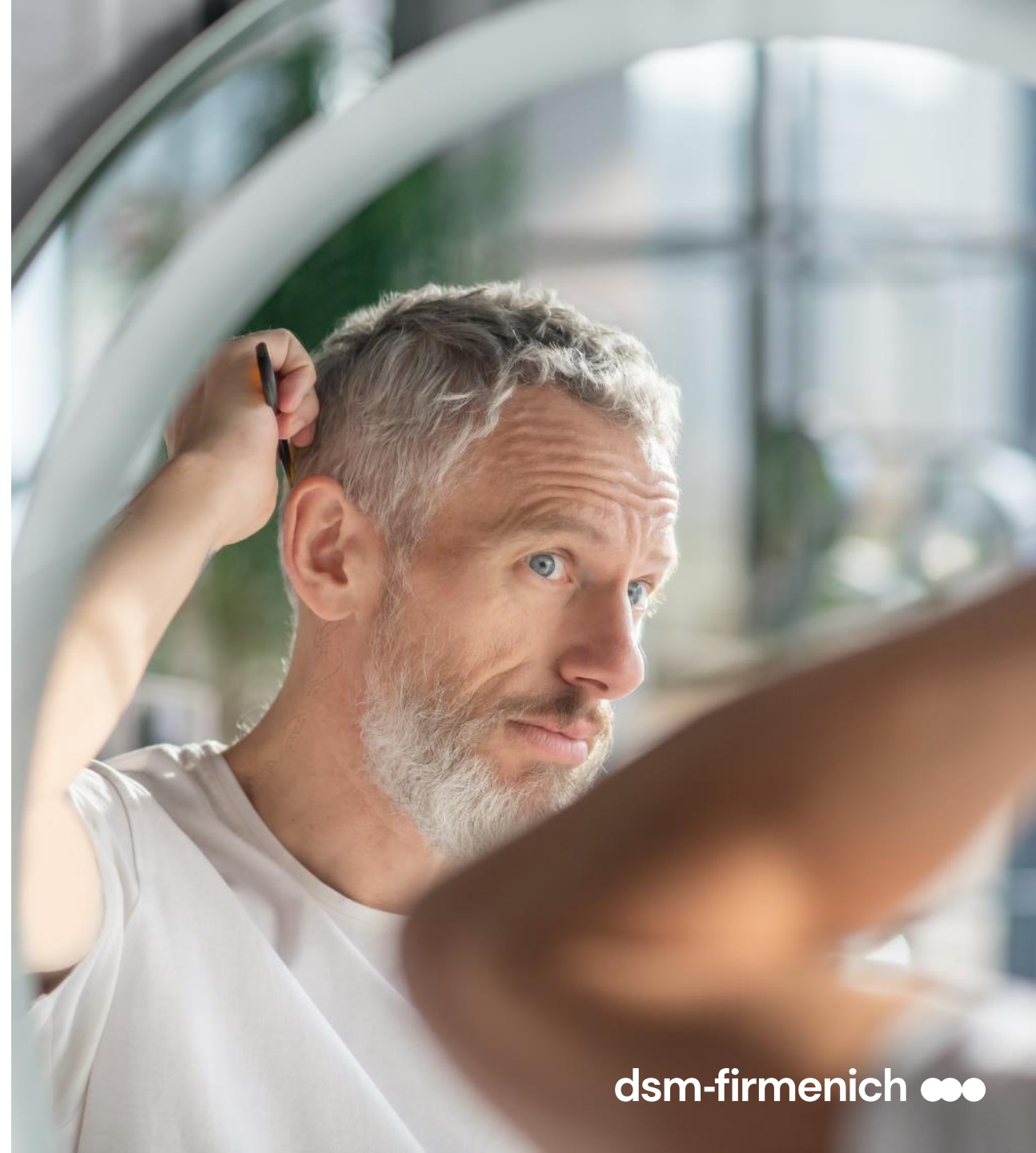
Reduced Hair Volume

It was found that Gen Z and females blamed hair dyeing and usage of wrong haircare products for hair loss to a higher extent than other subgroups



of respondents across all subgroups would do "a lot" or "anything" to prevent themselves from losing their hair

\*Helps prevent hair loss / Drug claim in some regions  
Source: dsm-firmenich Research 2021



# Consumers Express Their Greatest Challenges with Hair Loss\*



"I feel really sad when my hair comes out. It's very thin, anyway and I haven't got a lot around the front. A lot came on after I had a child. Every time I wash it, more comes out. Every time I brush it, more comes out."

Kier, 35  
Peterborough, UK

"I do personally take vitamins on top so I would like the product to be enriched in that in whatever form and absorbed into your scalp."

Jhunette, 35  
Sydney, Australia

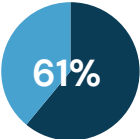
"The more natural the product is, the **more vitamins it has, the better it is for you.** I am all for products that offer additional vitamins to support the hair growth and anything like that to just take care of yourself."

Matt, 42  
Corona, USA

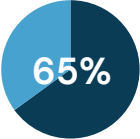
\*Helps prevent hair loss / Drug claim in some regions  
Source: dsm-firmenich Research, 2021, 45 respondents from US, UK, AU (15 per country)

# Scalp Care

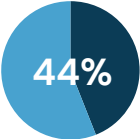
## Survey Insights



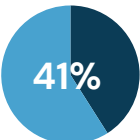
of respondents see stress/depression as the #1 cause for scalp issues, followed with some distance by unhealthy diet (48%)



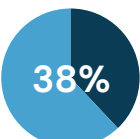
Itchy scalp is the #1 symptom for scalp problems



The claim that sufferers from scalp issues find most interesting is “moisturizes scalp and hair”

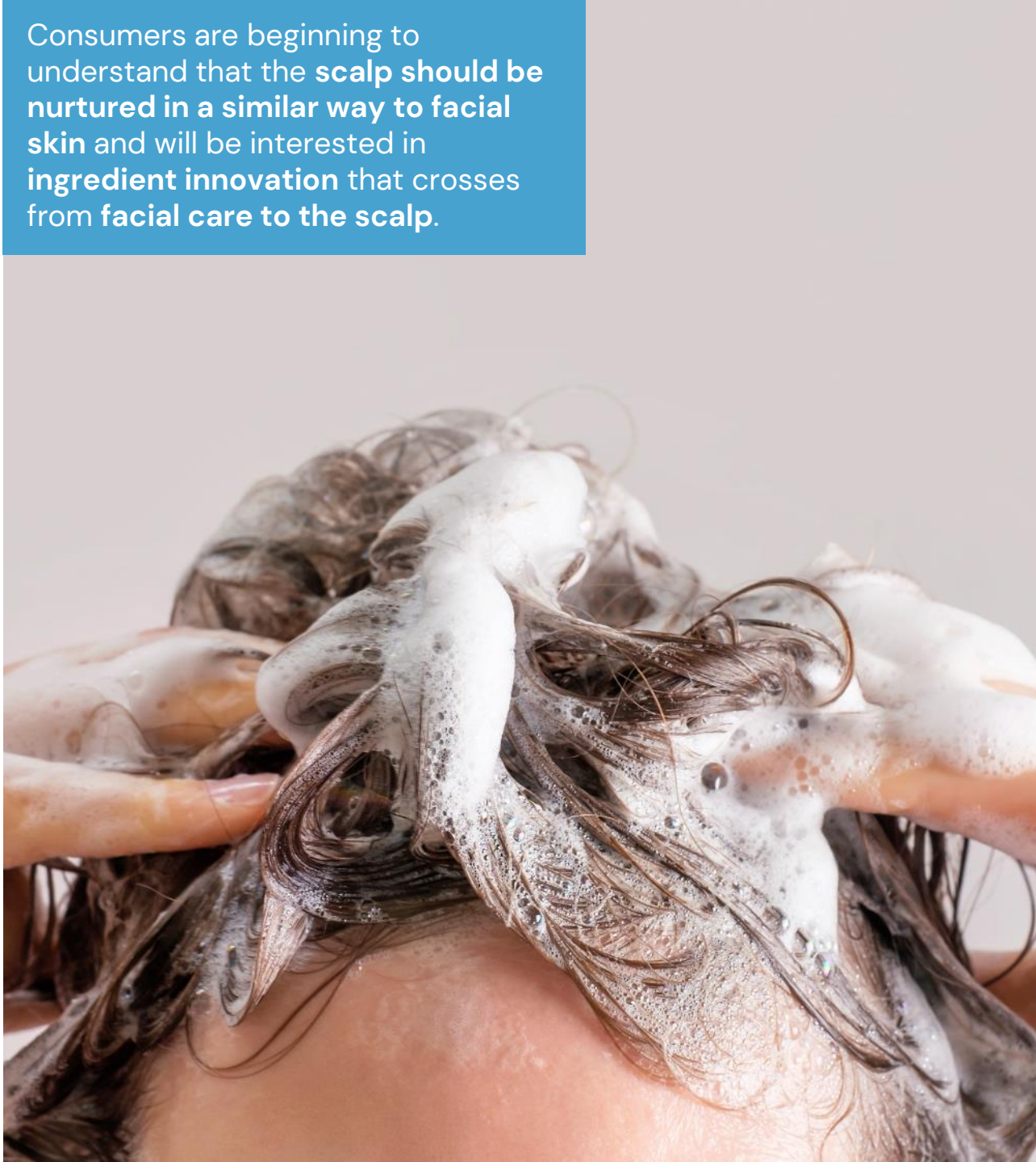


Followed with some distance by “soothes the scalp, reduces itchiness” – these claims especially resonate with Gen-Z consumers



Scalp cleansing products are considered as the first choice for preventing scalp issues

Consumers are beginning to understand that the scalp should be nurtured in a similar way to facial skin and will be interested in ingredient innovation that crosses from facial care to the scalp.



# Consumers Express Their Greatest Challenges with Scalp Care



"When I have **dandruff** or an **itchy head**, I get really **frustrated** and **embarrassed** because it makes you feel less clean."

Leah, 38

"My ideal solution would be something like a shampoo, or a cleanser, or something, some kind of **moisturizer that you could put on your scalp, that didn't weigh your hair down**, that cleansed your hair too, that would be perfect."

Tabitha, 45

"I'm a huge fan of **products with vitamins**. I believe they can help ease and heal lots of conditions in head or on the skin."

Samuel, 33

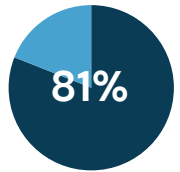
Source: dsm-firmenich Research, 2021, 45 respondents from US, UK, AU (15 per country)  
Source: Voxpopme with CMI PC Analysis -2021

# Anti-Grey

## Consumers seek anti-greying solutions

Greying Hair is a primary hair concern among both men and women

### 2020 Survey Insights



of respondents were interested in products that claim to prevent / reverse grey hair

#### Key Performance Claims for Anti-Aging Hair Care:

- Shine
- Long-Lasting
- Moisturizing / Hydrating
- Damaged Hair
- UV Protection
- Protection Against Elements

Source: Mintel



# Consumers Express Their Greatest Challenges with Grey Hair



"You're aging and you're **not as young as what you used to be** anymore..."

Zara, 30

"I **dye my hair to get rid of the gray** hair and I will do this as long as I'm able to"

Amy, 41

"They're **specifically for the roots**. I feel like the technology is a lot better actually to cover the roots."

Meagan, 36

Source: dsm-firmenich Research, 2021,105 respondents from US, UK, AU (40, 40, 24)

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# dsm-firmenich solutions for Hair Care

| BENEFIT                                     | INGREDIENT | Bioactives             |                        |           |             |                         |             |                  |             |            | Vitamins      |                               |                             |                            |                             |                       |                          | Performance                  |                   | UV Filters         |             |
|---------------------------------------------|------------|------------------------|------------------------|-----------|-------------|-------------------------|-------------|------------------|-------------|------------|---------------|-------------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------|--------------------------|------------------------------|-------------------|--------------------|-------------|
|                                             |            | ALPAFLOR® ALP-SEBUM CB | ALPAFLOR® EDELWEISS CB | ARGAN OIL | COLHIBIN CB | life'sGLA™ '10' n-6 Oil | PENTAVITIN® | PHYTALURONATE PF | Phytantriol | SETAKOL PF | STIMU-TEX® AS | BeauPlex® VH (Vitamins Blend) | Vitamin B3 (Niacinamide PC) | Pro-Vitamin B5 (Panthenol) | Vitamin B6 (Pyridoxine HCl) | Vitamin B7 (D-Biotin) | Vitamin C and STAY-C® 50 | Vitamin E (Tocopherol forms) | TILAMAR® Quat 640 | TILAMAR® Quat 2240 | PARSOL® SLX |
| Anti-breakage                               |            |                        |                        | •         | •           | •                       |             | •                | •           | •          |               |                               |                             |                            |                             |                       |                          | •                            | •                 |                    |             |
| Anti-frizz                                  |            |                        |                        | •         |             | •                       |             |                  |             | •          |               |                               |                             |                            |                             |                       |                          |                              |                   |                    |             |
| Helps reduce the appearance of greying hair |            |                        | •                      |           |             |                         |             |                  |             |            | •             |                               |                             |                            |                             |                       |                          |                              |                   |                    |             |
| Color protection                            |            |                        |                        |           |             |                         |             |                  |             |            |               |                               |                             |                            |                             |                       |                          |                              |                   | •                  | •           |
| Conditioning / ease of combing              |            |                        |                        | •         | •           | •                       |             | •                | •           | •          |               |                               |                             |                            |                             |                       |                          | •                            | •                 | •                  |             |
| Flaking reduction                           |            |                        |                        |           |             |                         | •           |                  |             |            |               |                               |                             |                            |                             |                       |                          |                              |                   |                    |             |
| Helps prevent hair loss*                    |            | •                      | •                      |           |             |                         |             |                  |             |            | •             |                               |                             | •                          | •                           | •                     | •                        |                              |                   |                    |             |
| Hair protection                             |            |                        | •                      |           |             |                         |             |                  |             |            | •             |                               |                             |                            |                             | •                     | •                        |                              |                   | •                  | •           |
| Hair strengthening                          |            |                        |                        |           |             |                         |             |                  |             |            | •             |                               | •                           |                            |                             |                       |                          |                              |                   |                    |             |
| Hair thickening                             |            |                        |                        |           |             |                         |             |                  |             |            | •             | •                             | •                           | •                          |                             |                       |                          |                              |                   |                    |             |
| Heat protection                             |            |                        |                        |           |             |                         |             |                  |             |            |               |                               |                             |                            |                             |                       |                          |                              |                   |                    |             |
| Scalp care                                  |            | •                      |                        |           |             |                         | •           |                  |             | •          | •             | •                             | •                           | •                          | •                           | •                     | •                        |                              |                   |                    |             |
| Sebum reduction                             |            | •                      |                        |           |             |                         | •           |                  |             |            |               |                               |                             | •                          |                             |                       |                          |                              |                   |                    |             |
| Shine                                       |            |                        |                        | •         |             | •                       |             |                  |             | •          |               |                               |                             |                            |                             |                       |                          |                              |                   |                    | •           |
| Split-ends reduction                        |            |                        |                        | •         | •           | •                       |             | •                | •           | •          |               |                               |                             |                            |                             |                       |                          |                              |                   |                    |             |
| Volume                                      |            |                        |                        |           |             |                         |             |                  |             |            | •             | •                             |                             |                            |                             |                       |                          |                              |                   |                    |             |

\*Drug claim in some regions

# 03

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# ALPAFLOR® EDELWEISS CB

Beyond Natural



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# ALPAFLOR® EDELWEISS CB

## ID Card



|                        |                                                                                                                                                |                                                 |                                                          |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|----------------------------------------------------------|
| Key benefit:           | Helps prevent hair loss* (improves hair density)<br>Helps reduce the appearance of greying hair<br>Anti-aging (strong anti-oxidant properties) |                                                 |                                                          |
| INCI name:<br>(Active) | Leontopodium Alpinum Flower/Leaf Extract                                                                                                       |                                                 |                                                          |
| Description:           | Plant extract organically cultivated                                                                                                           |                                                 |                                                          |
| Technical:             | Form: Liquid<br>Use level: Up to 3%<br>pH of use: 3.5 to 5.5                                                                                   | Preservative: Free<br>Solubility: Water soluble | Target: Scalp<br>Biodegradability: Readily biodegradable |

Registration certification



\*Drug claim in some regions

# ALPAFLOR® EDELWEISS CB

Hair Loss\*



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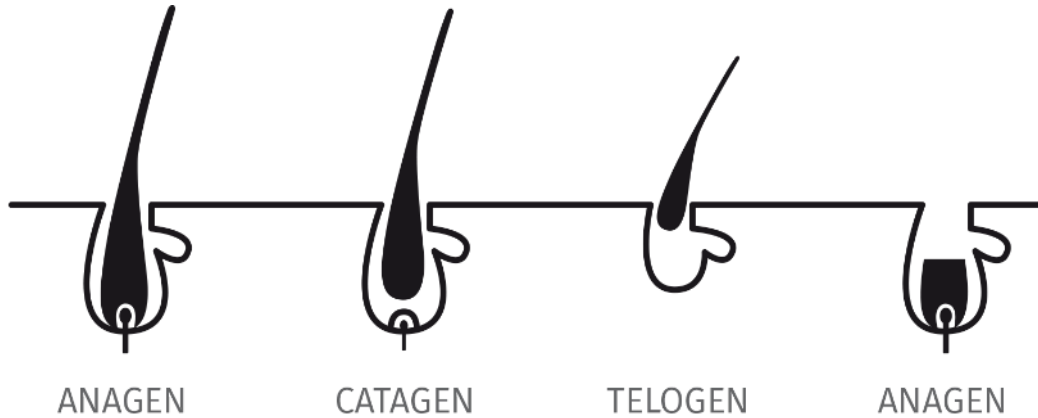
\*Helps prevent hair loss / Drug claim in some regions

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# ALPAFLOR® EDELWEISS CB

Ex vivo studies – Hair loss\*

The hair growth cycle consists of 3 distinct stages: anagen, catagen and telogen\*\*

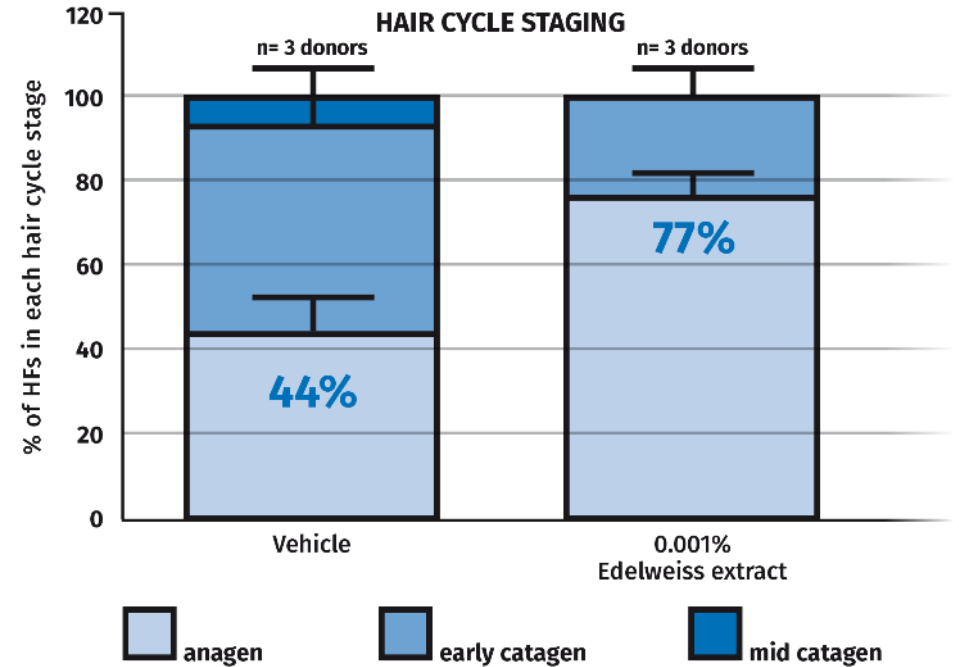


Anagen known as "growing" phase

Edelweiss extract prolongs anagen phase of hair follicles

\*Helps prevent hair loss / Drug claim in some regions

\*\*<https://www.philipkingsley.com>



1.8 x more hair follicles in the anagen phase with Edelweiss than placebo

Based on hair cycle score the difference between vehicle and Edelweiss is significant ( $p < 0.05$ )

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# ALPAFLOR® EDELWEISS CB

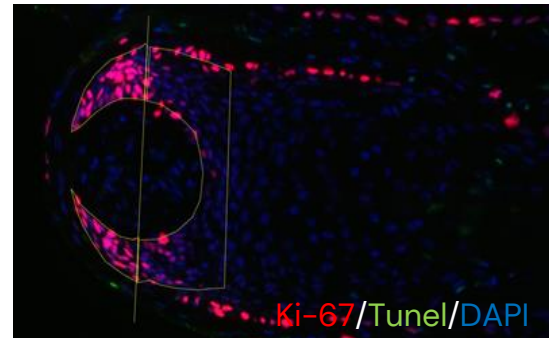
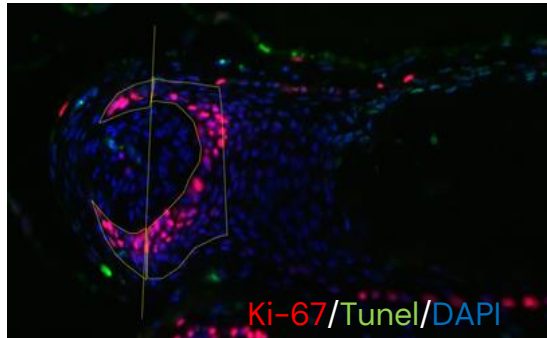
## Ex vivo studies – Hair loss\*



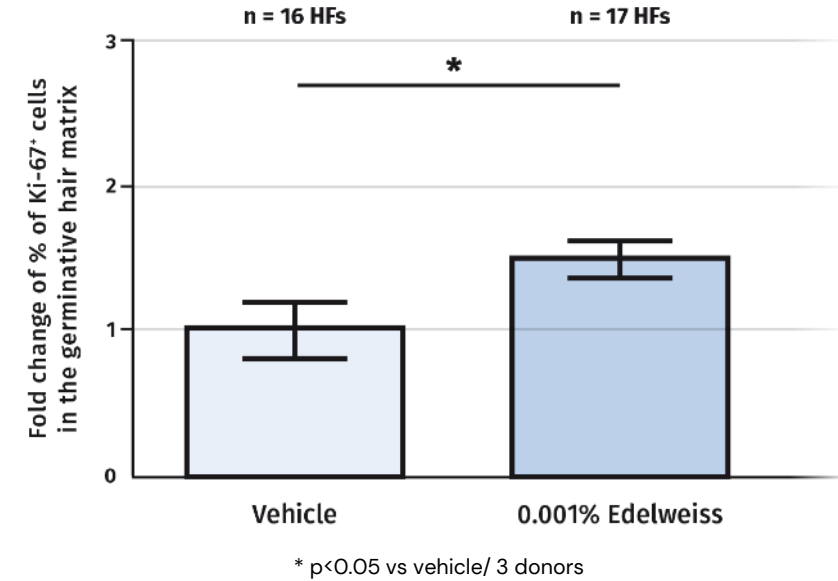
Keratinocytes make up the hair shaft and need to proliferate in order to support the hair growth.

### Vehicle

### 0.001% Edelweiss Extract



Increased Ki67-staining (red) in Edelweiss treated follicles compared to vehicle.

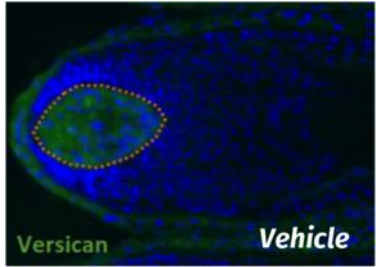


+50% increase of hair matrix keratinocytes proliferation with Edelweiss extract

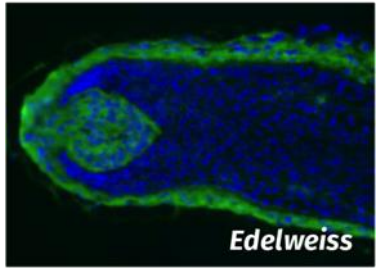
\*Helps prevent hair loss / Drug claim in some regions

# ALPAFLOR® EDELWEISS CB

## Ex vivo studies – Hair Loss\*

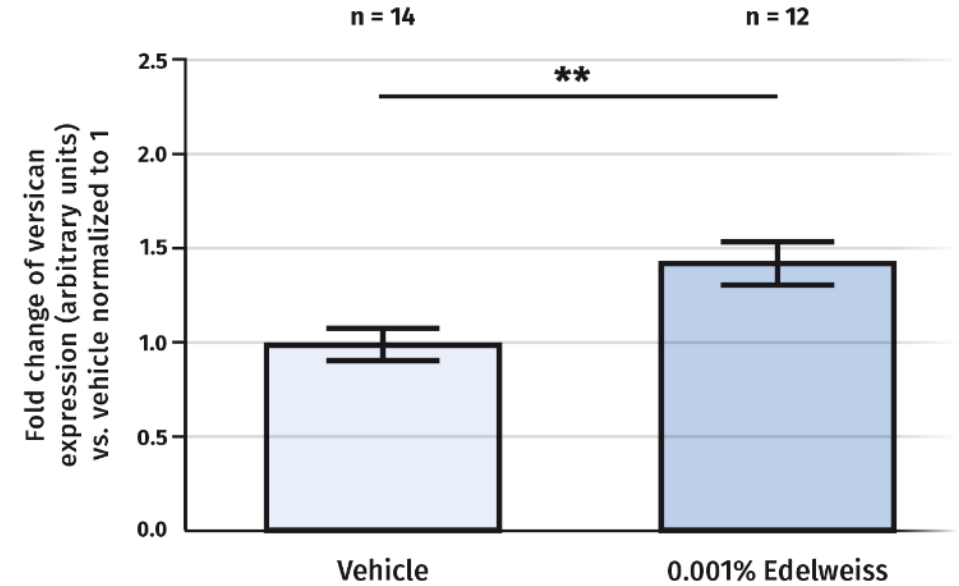


**Versican**, a large extracellular matrix proteoglycan, in the dermal papilla of the hair follicles.



**Versican** was shown to be highly associated with growing hair follicles and is a marker for hair growth inductivity

The orange dotted line highlights the dermal papilla where measurement was done.



\*\* p<0.01 vs vehicle / 3 donor

**+43% increase of Versican in the dermal papilla thanks to Edelweiss extract.**

\*Helps prevent hair loss / Drug claim in some regions

# ALPAFLOR® EDELWEISS CB

## Study Design / Hair Loss\*

### Target group

18–65 y.o. (mean 45 y.o.)

### 30 Volunteers per formulation

Placebo

ALPAFLOR® EDELWEISS CB 3%

**Application: 5 months  
daily, scalp, leave-on**

Double-blind, randomized

\*Helps prevent hair loss / Drug claim in some regions



# ALPAFLOR® EDELWEISS CB

## In vivo studies – Hair density

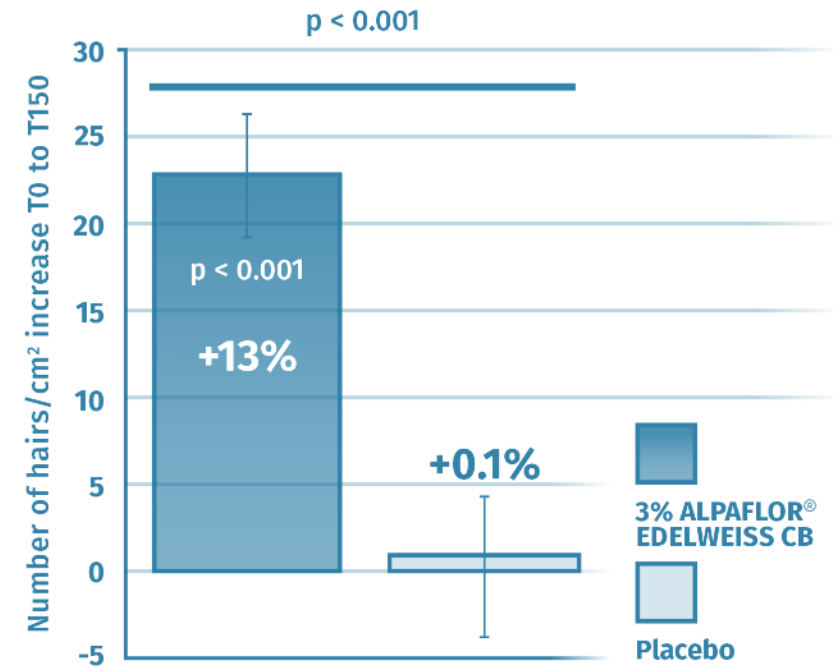


13% increase in hair density versus T0 with the Edelweiss extract

Significant better performance than Placebo after 5 months

90% of volunteers treated with ALPAFLOR® EDELWEISS CB measured an increase in hair density, while 57% of volunteers using Placebo

## Hair Density after 5 months (number of hairs / cm<sup>2</sup>)



# ALPAFLOR® EDELWEISS CB

## In vivo studies – Hair density / micro-images

Visible increase of hair density **+49%** of hair  
(example #76)

TO



Volunteer # 76

T150



From 142 to 211 hairs/cm2 (+49%)



dsm-firmenich own study



dsm-firmenich

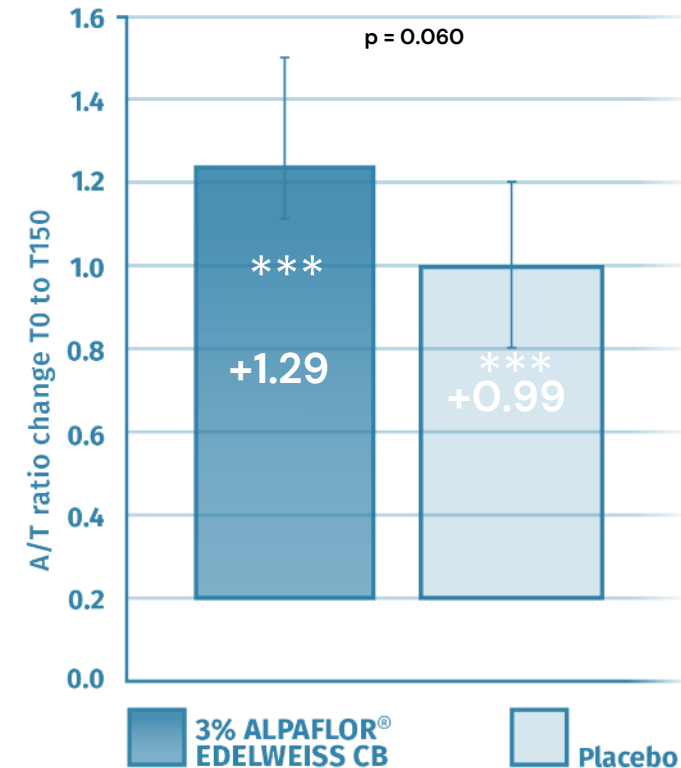
# ALPAFLOR® EDELWEISS CB

## In vivo anagen / telogen – Hair loss\*



Higher proportion of hair in anagen phase using a serum with ALPAFLOR® EDELWEISS CB after 5 months.

20% more hair in the anagen phase with ALPAFLOR® EDELWEISS CB than placebo.



\*Helps prevent hair loss / Drug claim in some regions  
n= 30 – SEM error bars \*\*\*p < 0.001 vs T0  
15 to 25 hairs collected per volunteer for trichogram

## Consumers confirm efficacy

### Participants feedback after treatment with ALPAFLOR® EDELWEISS CB



100% liked the product



90% noticed increased speed of hair growth

Self assessment  
Clinical study, 30 volunteers, 18 – 65 years old



# ALPAFLOR® EDELWEISS CB

## Publication

International Journal of  
**Cosmetic Science**

SOCIÉTÉ FRANÇAISE DE  
COSMÉTOLOGIE



ORIGINAL ARTICLE |  Open Access |   

**An extract of *Leontopodium alpinum* inhibits catagen development ex vivo and increases hair density in vivo**

Remo Campiche , Alizée Le Riche, Janin Edelkamp, Alfonso Fernandez Botello, Emmanuel Martin, Mathias Gempeler, Marta Bertolini

First published: 06 May 2022 | <https://doi.org/10.1111/ics.12783>

<https://onlinelibrary.wiley.com/doi/10.1111/ics.12783>



# ALPAFLOR® EDELWEISS CB

Hair pigmentation\*



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\*Helps reduce the appearance of greying hair

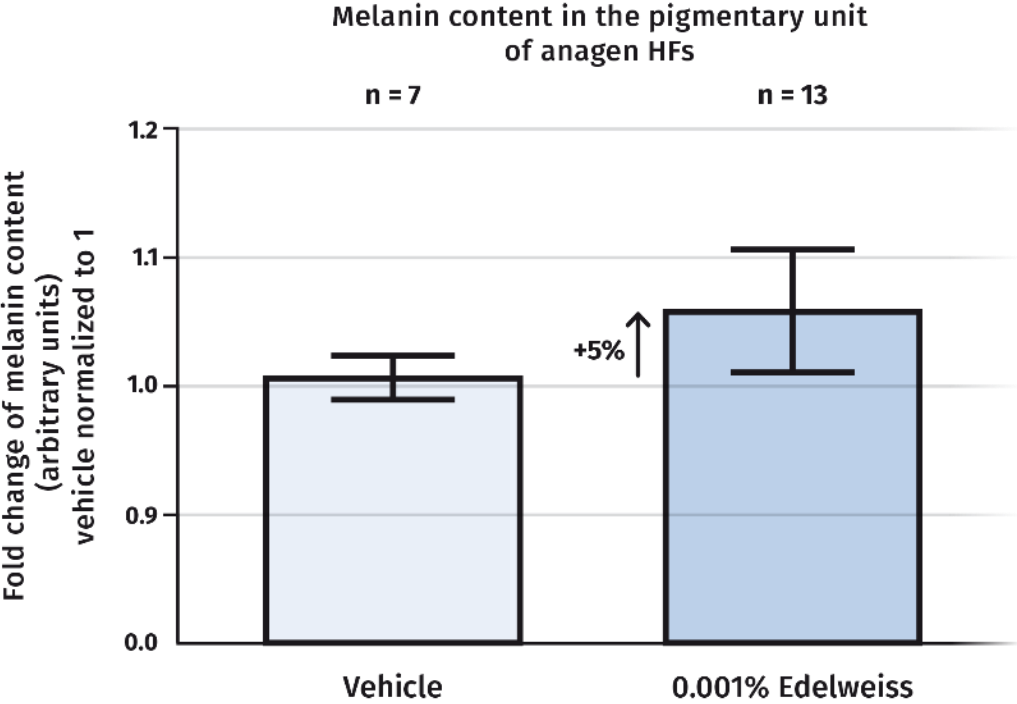
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# ALPAFLOR® EDELWEISS CB

Ex vivo studies – Hair pigmentation\*/  
Hair darkening



5% melanin content increase in Edelweiss treated hair follicles compared to vehicle treated follicles



\*Helps reduce the appearance of greying hair

# ALPAFLOR® EDELWEISS CB

## Study Design / Hair Pigmentation\*

### Target group

- 18–45 y.o. (mean 39 y.o.)

### 30 Volunteers per formulation

- Placebo
- ALPAFLOR® EDELWEISS CB 3%

**Application: 4 months  
daily, scalp, leave-on**

**Double-blind, randomized**

\*Helps reduce the appearance of greying hair



# ALPAFLOR® EDELWEISS CB

*In vivo* studies – Hair pigmentation\* / Hair darkening



Results after 4 months – leave-on treatment – 3% ALPAFLOR® EDELWEISS

T0



Volunteer # 29

T120



+ 13% more pigmented hair after 4 months versus T0 ( $p=0.002$ )  
Significant less grey hair vs. Placebo ( $p=0.026$ ) after 4 months  
63% of volunteers showed improvement in hair pigmentation using ALPAFLOR® EDELWEISS CB, while 47% of the volunteers using placebo.

Evaluation of ratio of non-white hair vs. white hair on micro-images taken at T0 and T120

\*Helps reduce the appearance of greying hair

# ALPAFLOR® EDELWEISS CB

*In vivo* studies – Hair pigmentation\* / Hair darkening



**Results after 4 months – leave-on treatment – 3% ALPAFLOR® EDELWEISS**

**T0**



Example: Volunteer #24

**T120**



Evaluation of grey shade of hairs after 4 months

Image of entire head analyzed by software:  
Grey scale of pixels from 0 (black) to 255 (white)

**Darker hair appearance after 4 months**  
**50%** less grey hair versus Placebo

Evaluation of ratio of non-white hair vs. white hair on micro-images taken at T0 and T120

\*Helps reduce the appearance of greying hair

# Consumers confirm efficacy

## Participants feedback after treatment with ALPAFLOR® EDELWEISS CB



83% perceived a decrease  
in the number of grey hairs



87% thought the color of their  
hair was more uniform



83% thought their hair looked darker

# ALPAFLOR® EDELWEISS CB

## Takeaways

### Key Features

Sustainably and organically cultivated according to Bio Suisse organic standards and fair-trade principles

### Use level 3%

### Helps prevent hair loss\* (improves hair density)

- Prolongs anagen growing phase of hair. 1.8 x more than placebo – ex vivo
- 50% increase of hair follicles keratinocytes proliferation – ex vivo
- Increase by 43% versican expression & alkaline phosphatase activity – ex vivo
- 13% increase in hair density after 5 months – in vivo
- Increase Anagen/Telogen ratio – in vivo

### Helps reduce the appearance of greying hair

- 5% increase in melanin content – ex vivo
- 13% darker hair after 4 months – in vivo
- 50% less grey hair versus Placebo – in vivo

\*Drug claim in some regions



# 04

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# PENTAVITIN®

Visibly reduces scalp  
oiliness and flaking



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PENTAVITIN®  
ID Card



|                        |                                                                                                              |                                                 |                                                                                 |
|------------------------|--------------------------------------------------------------------------------------------------------------|-------------------------------------------------|---------------------------------------------------------------------------------|
| Key benefit:           | Moisturizes dry scalp / Strong scalp barrier<br>Provides visible reduction of scalp flaking<br>Reduces Sebum |                                                 |                                                                                 |
| INCI name:<br>(Active) | Saccharide Isomerate                                                                                         |                                                 |                                                                                 |
| Description:           | 100% natural and biodegradable edible maize kernels derived.<br>It binds to scalp like a magnet.             |                                                 |                                                                                 |
| Technical:             | Form: Liquid<br>Use level: 0.2 – 1%<br>pH of use: 4 to 9                                                     | Preservative: Free<br>Solubility: Water soluble | Target: Scalp and hair fiber<br>Biodegradability: Estimated to be biodegradable |

Registration certification



# The Science behind the moisturizer – PENTAVITIN®

- Biomimetic ingredient that reproduces the effects of the skin/scalp's own natural moisturizing factor (NMF).
- Unique skin binding action
- Contributes significantly to skin/scalp's moisturization.
- It is only removed from scalp/skin by desquamation, providing a long term moisturization and effects under rinse-off conditions



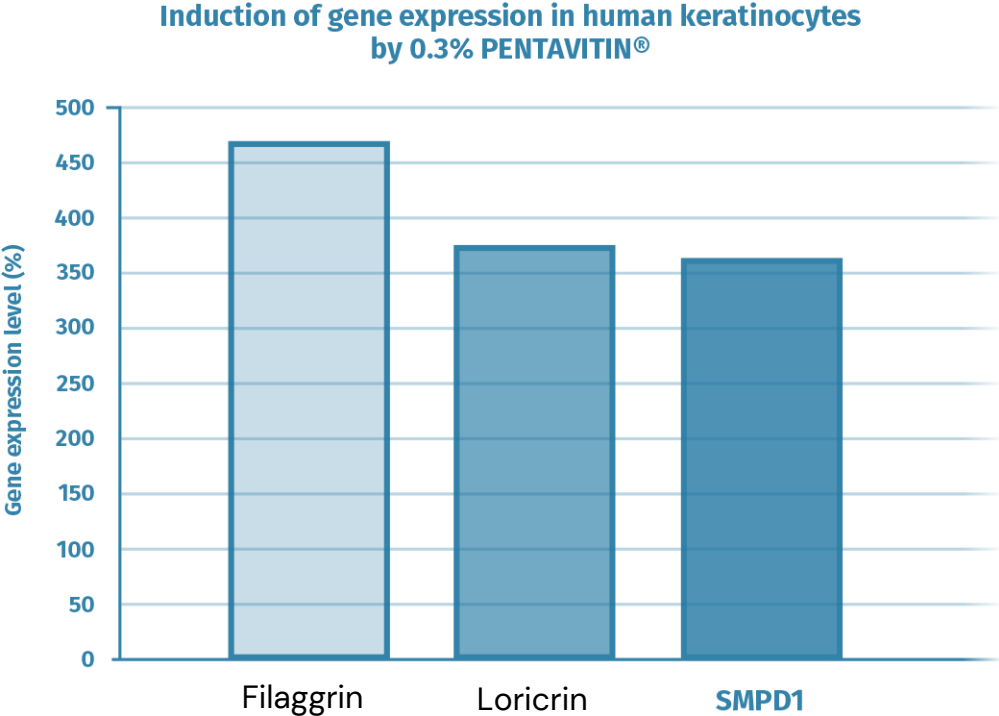
PENTAVITIN®



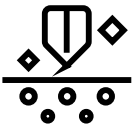
NMF



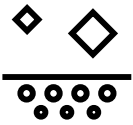
# PENTAVITIN® – Moisturizing, protection and strengthening



Moisturizes dry scalp  
by boosting filaggrin



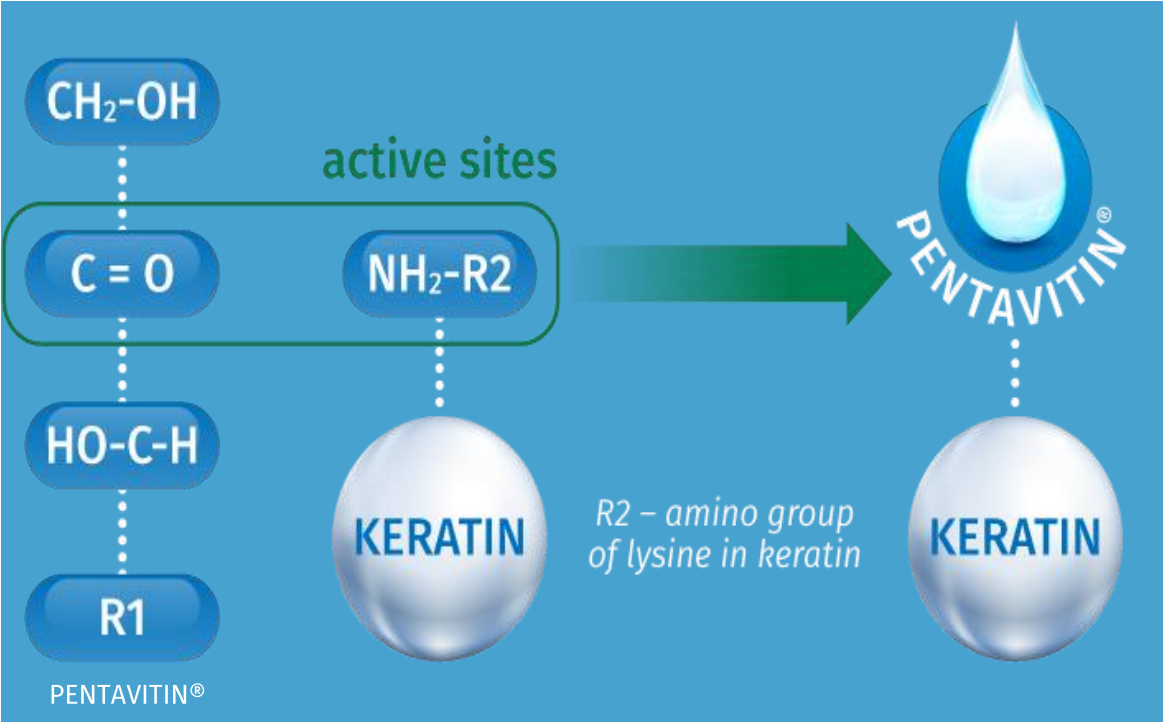
Protects scalp barrier  
by boosting loricrin



Strong scalp barrier  
by boosting SMPD1\*

\*SMPD1: Sphingomyelin phosphodiesterase 1 converts sphingomyelin to ceramide known to strengthen scalp barrier

# Binds to keratin as magnet power!



Mode of action



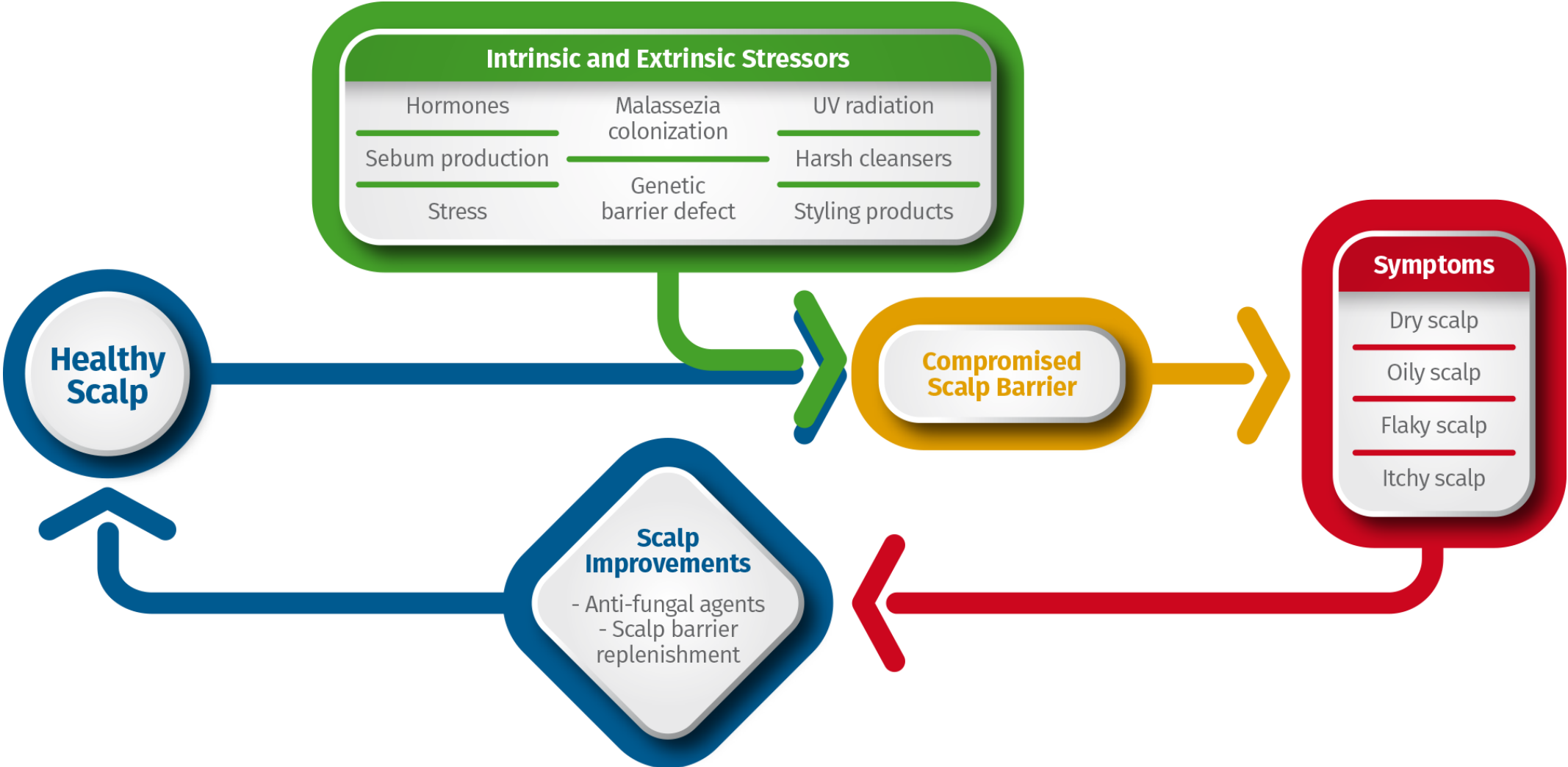
Binds to keratin  
as magnet power\*

Perfectly connects  
with the skin's top layers\*

Not washed off

\*In vitro

# How to get a healthy scalp?



Turner et al. Stratum corneum dysfunction in dandruff. Int J Cosmet Sci 34:298, (2012)

# PENTAVITIN®

## Study Design / Scalp Care

### Target group

- 18–50 y.o. (mean 39 y.o.) + ASF Score 24–40

### 30 Volunteers per formulation

- Placebo
- PENTAVITIN® 0.2% and 0.5%

**Application: 28 days  
rinse-off , shampoo applied  
every 2 days**

**Single-blind, randomized**



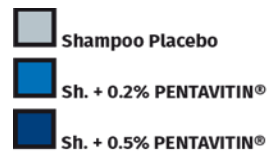
# PENTAVITIN® – Reinforced scalp barrier

## 24 hour after one single application and frequent showering

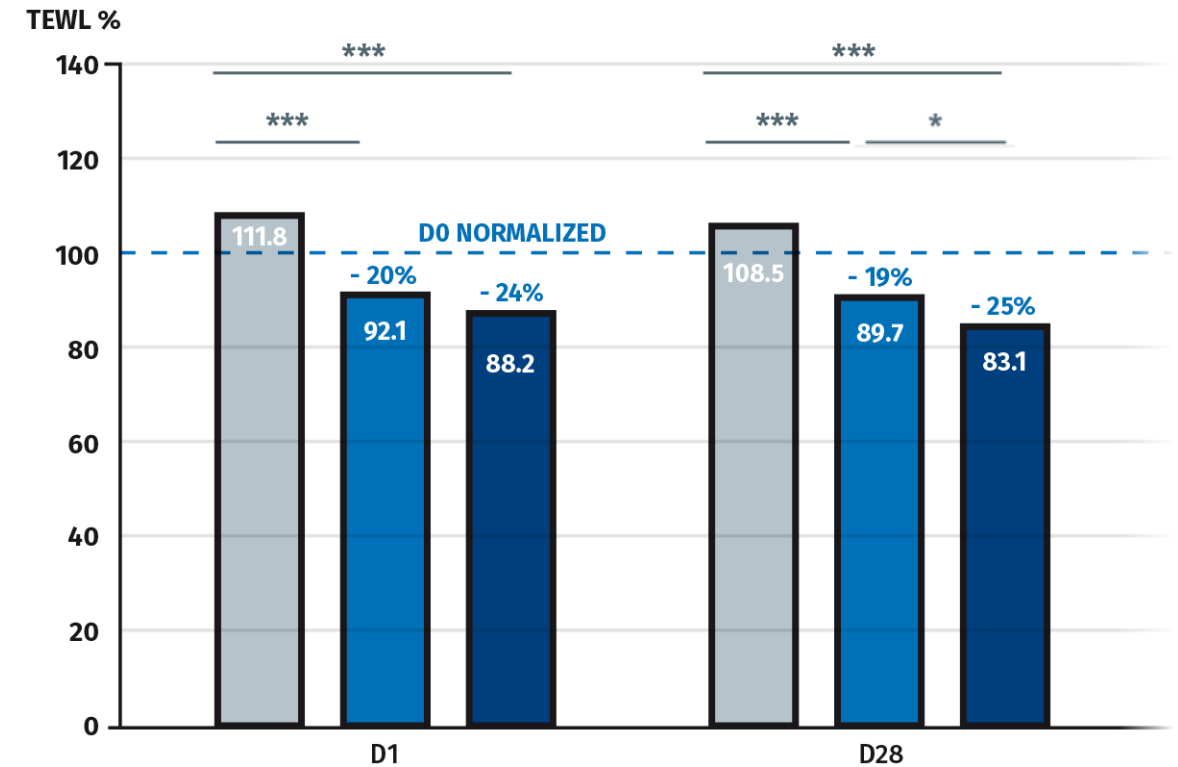
Use of the **shampoo placebo** damages the **scalp barrier** after showering and it is not recovered even after 28 days.

24 hour (D1) after **one single application** and even after 28 days of frequent showering, shampoos with 0.2% and 0.5% **PENTAVITIN®** reinforce the **scalp barrier**.

**PENTAVITIN®**'s improvements over the placebo are highly statistically significant.



*n* = 30 – SEM error bars  
\*\*\**p* < 0.001



Tewameter TM nano – Dandruff site  
Reduction versus placebo



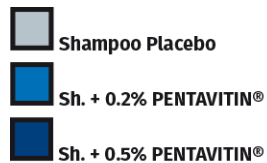
# PENTAVITIN® – Sebum Reduction

24 hour after one single application and frequent showering

15% sebum reduction 24 hour (D1) after one single application with a shampoo containing PENTAVITIN® (0.5%)

37% sebum reduction after frequent showering with a shampoo containing PENTAVITIN® (0.5%)

PENTAVITIN®'s (0.2% and 0.5%) improvements over the placebo are highly statistically significant

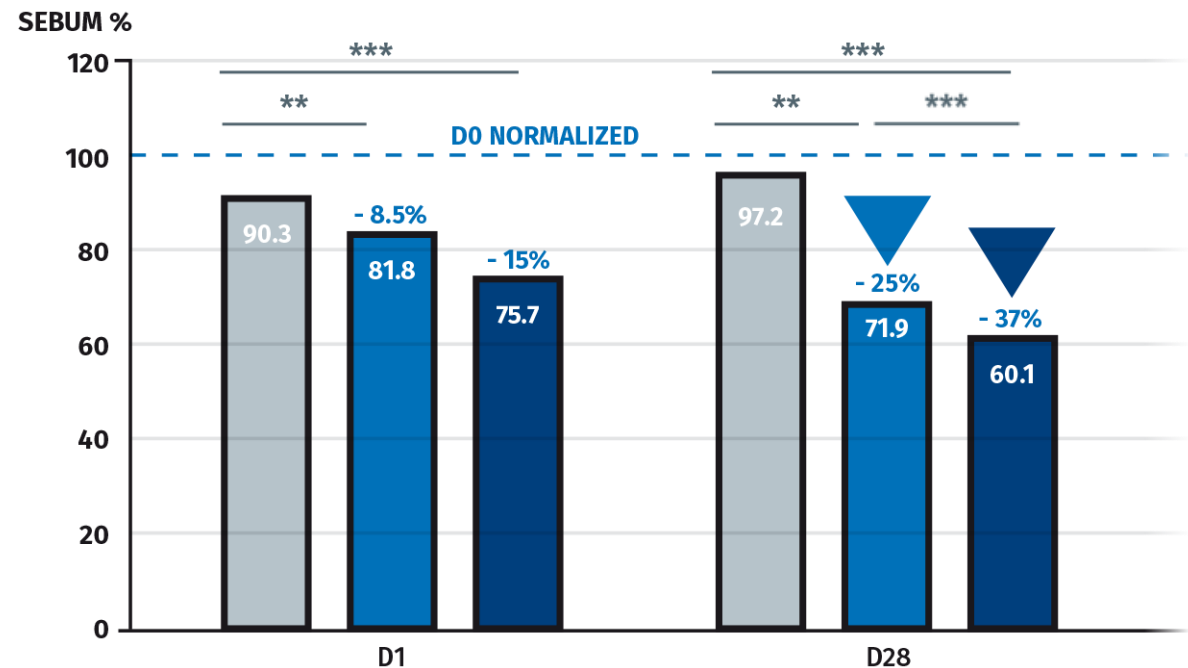


$n = 30$  – SEM error bars  
\*\*\* $p < 0.001$  \*\* $p < 0.01$

Meibometer, MB560– Dandruff site  
Reduction versus placebo



dsm-firmenich  
own study



# PENTAVITIN® – Anti-Flaking

24 hour after one single application and frequent showering

14% reduction of scalp flaking 24 hour (D1) after one single application with shampoos containing PENTAVITIN® (0.2% and 0.5%)

Up to 55% reduction of scalp flaking after frequent showering with shampoos containing PENTAVITIN® (0.5%)

PENTAVITIN®'s (0.2% and 0.5%) improvements over the placebo are highly statistically significant



$n = 30$  – SEM error bars  
\*\*\* $p < 0.001$  \* $p < 0.05$

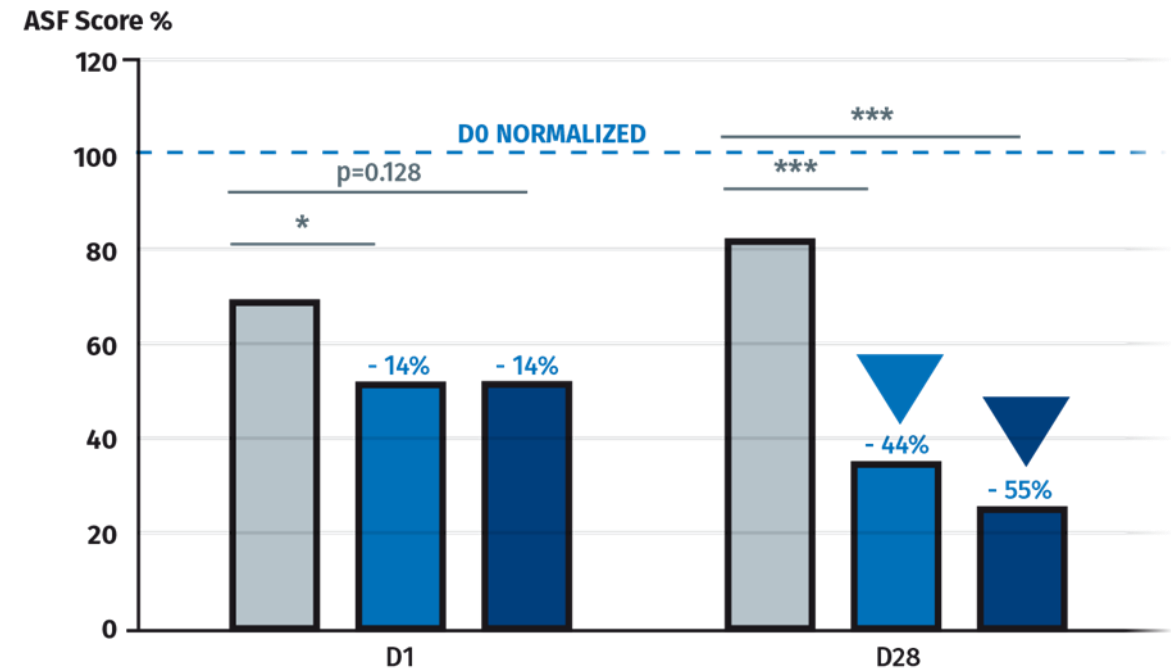
Grade of ASFS dandruff – Dermatologist  
Reduction versus placebo



dsm-firmenich  
own study



After 28 days of treatment, the placebo increases flaking while PENTAVITIN® reduces it



# PENTAVITIN® – Flaking Reduction

## Visible reduction of scalp flaking



DO – Before treatment



D1 – 24 hours, after just one use of a shampoo with PENTAVITIN® (0.2%)



D28 – 28 days, after frequent showering with a shampoo containing PENTAVITIN® (0.2%)



DO – Before treatment



D1 – 24 hours, after just one use of a shampoo with PENTAVITIN® (0.5%)



D28 – 28 days, after frequent showering with a shampoo containing PENTAVITIN® (0.5%)

## Consumers confirm efficacy

### Scalp & hair improvements after 28 days

dsm-firmenich ●●●  
own study

#### PENTAVITIN® 0.2%



67% stated "my scalp feels itchy-free, soothed"



80% stated "my scalp feels fresh"



80% stated "my scalp feels hydrated"

#### PENTAVITIN® 0.5%



70% stated "my scalp feels protected from external aggressions."



77% stated "my scalp looks healthy"



60% stated "my hair feels strong"

Received: 21 December 2021 | Revised: 21 February 2022 | Accepted: 1 March 2022

DOI: 10.1111/jocd.14913

ORIGINAL ARTICLE



WILEY

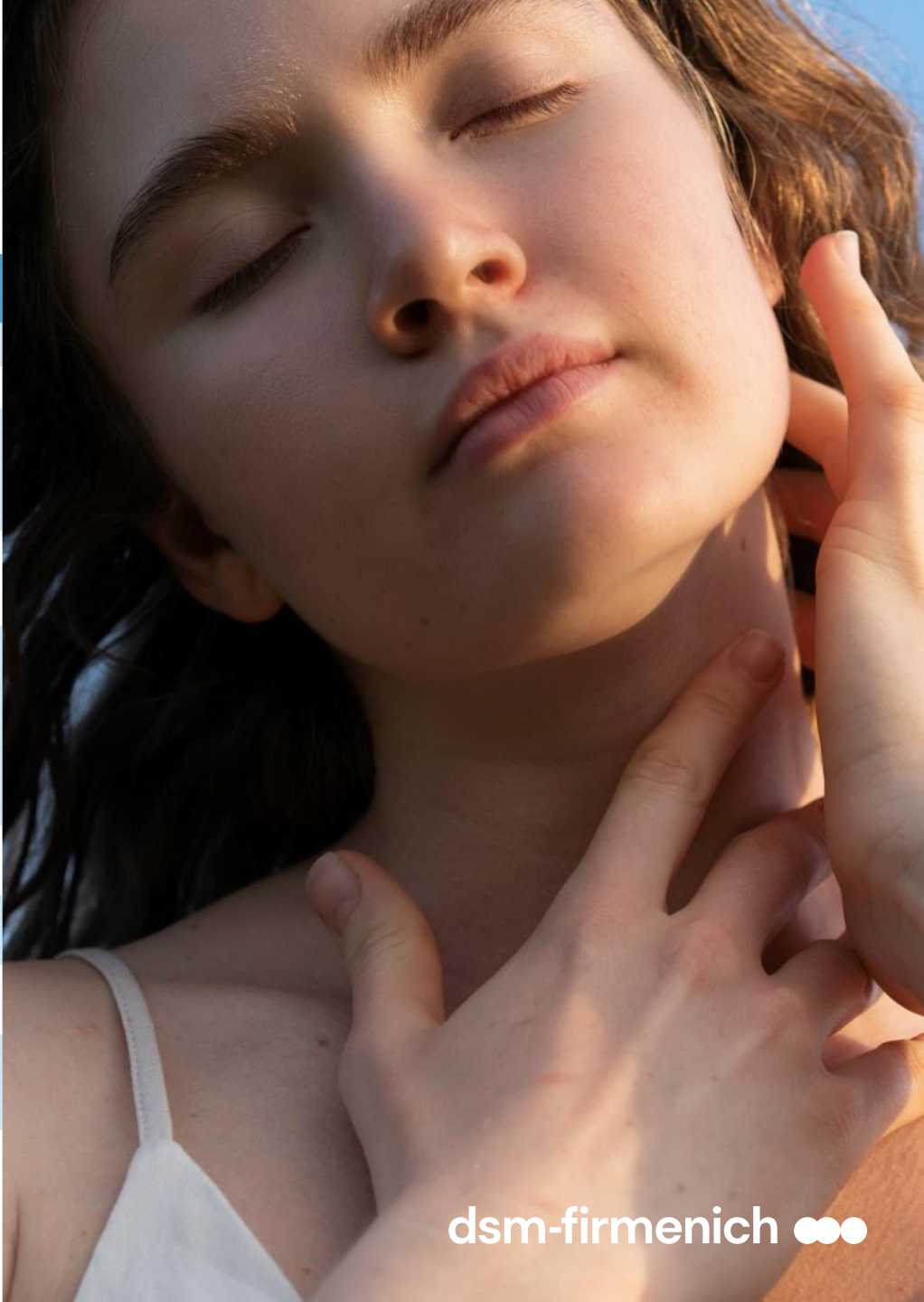
Saccharide isomerate ameliorates cosmetic scalp conditions in a Chinese study population

Emmanuel Martin MS<sup>1</sup> | Anson Zhang MS<sup>2</sup> | Remo Campiche PhD<sup>1</sup> 

# PENTAVITIN®

## New discoveries

| Study Design                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Institute                                  | TRI Princeton (USA) – Proof of concept scalp hydration and sebum study on two volunteers.                                                                                                                                                                                                                                                                                                                                                                                                            |
| Data collection                                 | Jan. 2022.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Test products                                   | Shampoo placebo vs. Shampoo with 0.5% PENTAVITIN®: Aqua, Sodium laureth sulfate, Glycerin, Coco-betaine, Sodium cocoamphoacetate, Sodium chloride, Sodium lauryl glucose carboxylate, Lauryl glucoside, Sodium cocoyl glutamate, Lactic acid, PENTAVITIN®, Phenoxyethanol, Benzyl alcohol, Potassium sorbate, Tocopherol.                                                                                                                                                                            |
| Skin characteristics of the selected volunteers | Scalp hydration study: one healthy female volunteer (Caucasian, 27 years old ).<br>Scalp sebum study: one healthy female volunteer (Caucasian, 24 years old, scalp has dandruff and tends to be on the oilier side).                                                                                                                                                                                                                                                                                 |
| Study duration                                  | <ul style="list-style-type: none"><li>• 1 week wash out with shampoo Placebo (Baseline').</li><li>• Daily application of Shampoo Placebo for 7 days (day 7').</li><li>• 10 days break (personal hair routine).</li><li>• 1 week wash out phase with shampoo Placebo (Baseline').</li><li>• Daily application of Shampoo with PENTAVITIN® for 7 days (day 7').</li><li>• 'After each wash out phase and day 7 application, FTIR measurements are performed on 12 predefined sites on scalp.</li></ul> |
| Rinse-off test procedure                        | Test products were applied by gentle massage on scalp for 2–3 minutes.<br>Rinse gently and thoroughly the hair and scalp with warm water and drying with a towel.                                                                                                                                                                                                                                                                                                                                    |
| Measuring sites<br>Time points                  | <ul style="list-style-type: none"><li>• Hemi scalp, 12 predefined sites.</li><li>• Baseline and after 7 days.</li></ul>                                                                                                                                                                                                                                                                                                                                                                              |
| Evaluation                                      | ATR-FTIR (Fourier-Transform infrared) spectroscopy measurements with REMSpec optical fiber<br>From the IR spectrum, calculation of water and sebum content.                                                                                                                                                                                                                                                                                                                                          |
| Colour scales & test parameters                 | Scalp hydration and sebum are visualized with color scales, resp. from white to blue and white to brown, based on FTIR spectrum intensity. Calculation of difference between Baseline and Day 7 results.                                                                                                                                                                                                                                                                                             |



# Innovative Scalp Color 3D Mapping Technology

## The method...

ATR-FTIR (Fourier-transform infrared) spectroscopy in combination with specific algorithms generates 3D color scalp hydration & sebum mappings

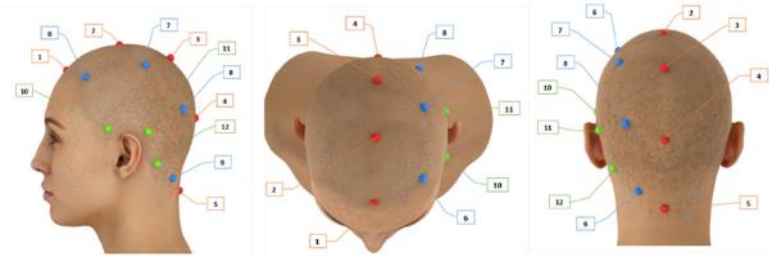
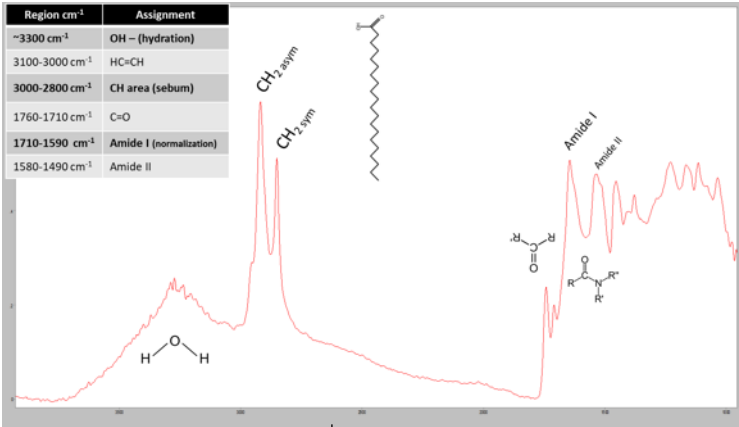


### Scalp Analysis

- 12 ATR-FTIR spectra are collected at the same specific location on the scalp to evaluate the level of sebum and water
- These measurements are used to generate specific scalp 3D mapping.

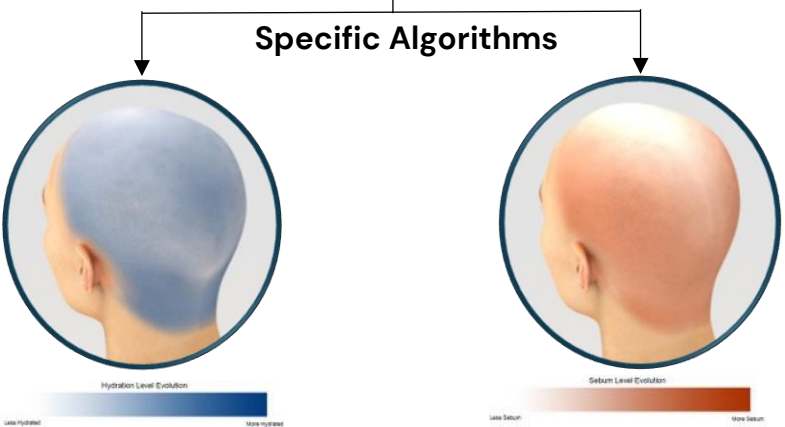
### Test Instrument

- FTIR spectrometer with REMSpec optical fiber



### Test Sites

- 12 predefined sites on the hemi scalp are selected



NEWTONE  
A QIMA Life Sciences Company

## Fully hydrated scalp after frequent use\*\*



**FTIR scalp hydration color 3D mapping**  
**Shampoo placebo / 7 days vs baseline**  
Less hydrated



**FTIR scalp hydration color 3D mapping**  
**Shampoo with 0.5% PENTAVITIN® / 7 days vs baseline**  
More hydrated

Visible hydration power after 7 days frequent use of PENTAVITIN® (0.5%) in a shampoo compared to placebo.

\*\*In vivo tested

## Visible sebum reduction after frequent use\*\*



**FTIR scalp sebum color 3D mapping Shampoo placebo / 7 days vs baseline**  
More sebum



**FTIR scalp sebum color 3D mapping Shampoo placebo / 7 days vs baseline**  
Less sebum

After 7-days frequent use of PENTAVITIN® (0.5%) in a shampoo, visible reduction in sebum observed on scalp.

\*\*In vivo tested

# PENTAVITIN®

## Takeaways

### Key features:

100% natural and biodegradable edible maize kernels derived. It binds to scalp like a magnet.

**Use level:** 0.2%–0.5%

### Key Benefits:

#### Moisturization (Reinforced scalp barrier)

- 24 hour (D1) after one single application and even after 28 days of frequent showering, shampoos with 0.2% and 0.5% PENTAVITIN® reinforce the scalp barrier – *in vivo*

#### Sebum and Flaking Reduction

- Significant reduces sebum and flaking after one single application and after frequent showering with a shampoo containing PENTAVITIN® (0.2% –0.5%) – *in vivo*



# 05

# Agenda

01 Market & Consumer Insights

02 dsm-firmenich Hair Care Solutions Map

03 ALPAFLOR® EDELWEISS CB

04 PENTAVITIN®

05 BeauPlex® VH

06 Other dsm-firmenich Solutions



Click on the number to get  
redirected to the chapter

# BeauPlex® VH

## Vitamin Blend



[Click to return  
to homepage](#)

dsm-firmenich 

# BeauPlex® VH

## ID Card



|              |                                                                                                                                                        |                                                        |                                                                             |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-----------------------------------------------------------------------------|
| Key benefit: | Helps prevent hair loss* (improves hair density and thickness)                                                                                         | Anti-aging (anti-oxidant properties)                   |                                                                             |
|              | Helps reduce the appearance of greying hair                                                                                                            | Scalp Care (improves scalp barrier and moisturization) |                                                                             |
| INCI name:   | Tocopheryl Acetate, Niacinamide, Sodium Ascorbyl Phosphate, Pyridoxine HCl, Sodium Starch Octenylsuccinate, Silica, Calcium Pantothenate, Maltodextrin |                                                        |                                                                             |
| Description: | Vitamin blend (B3, B5, B6, C and E)                                                                                                                    |                                                        |                                                                             |
| Technical:   | Form: Powder                                                                                                                                           | Preservative: Free                                     | Target: Scalp and hair fiber                                                |
|              | Use level: Up to 2%                                                                                                                                    | Solubility: Dispersible in water                       | Biodegradability: Not expected to be persistent, bioaccumulative nor toxic. |
|              | pH of use: 5 to 9                                                                                                                                      |                                                        |                                                                             |

Registration certification



\*Drug claim in some regions  
Quality for Life™ seal that guarantees the highest standards for Quality, Reliability, Traceability, and Sustainability.

# BeauPlex® VH

## Hair Loss\*



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to homepage](#)

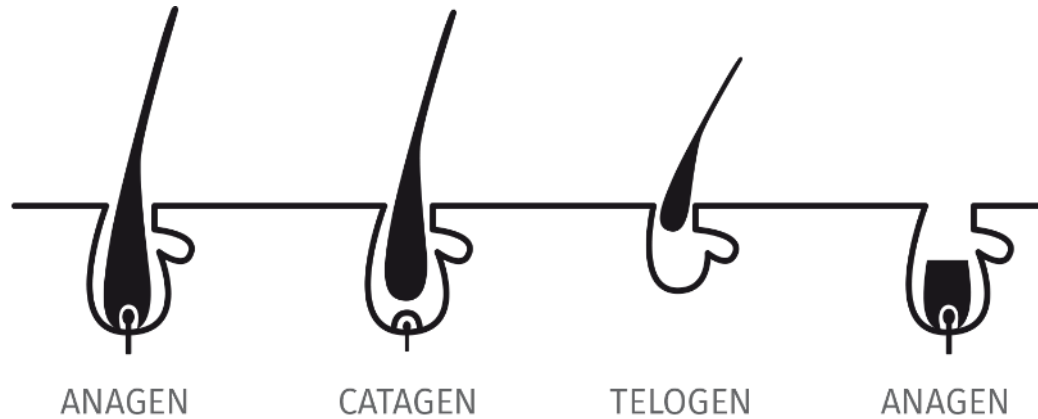
\*Helps prevent hair loss / Drug claim in some regions

dsm-firmenich 

# BeauPlex® VH

## Hair Loss\*

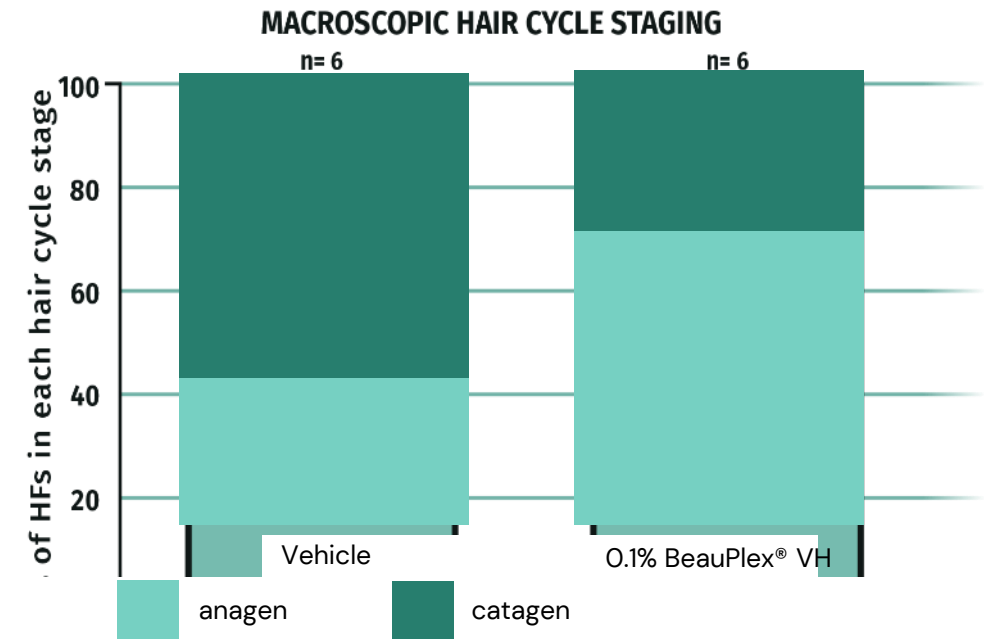
The hair growth cycle consists of 3 distinct stages:



BeauPlex® VH 0.1% prolongs anagen phase of hair follicles

\*Helps prevent hair loss / Drug claim in some regions

dsm-firmenich  
own study



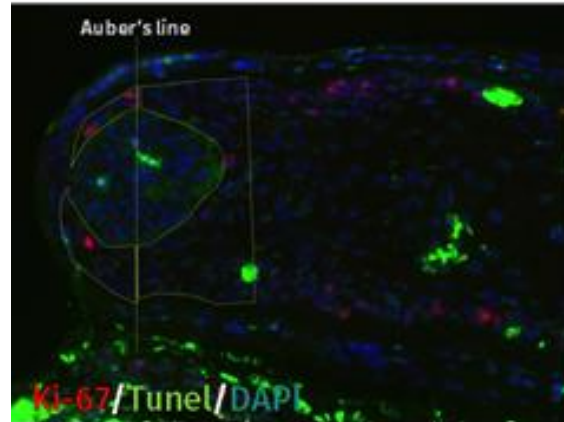
2x more hair follicles in the anagen phase with BeauPlex® VH than placebo

# BeauPlex® VH

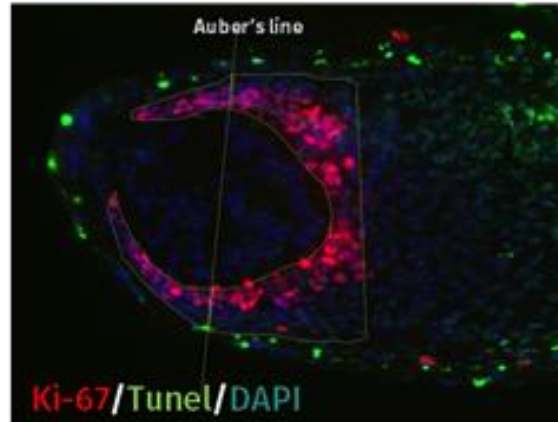
## Hair Loss\*

Keratinocytes make up the hair shaft and need to proliferate in order to support the hair growth.

Vehicle



0.1% BeauPlex® VH

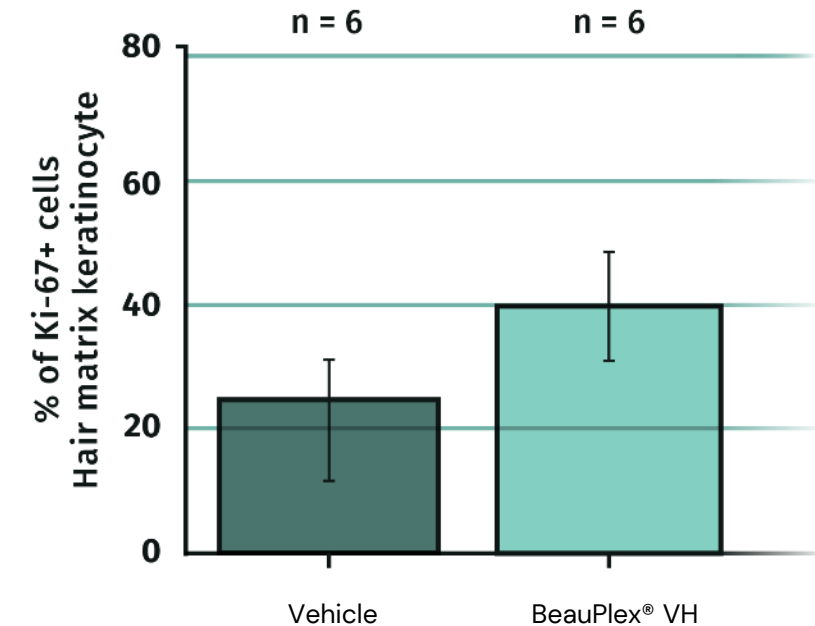


Increased Ki67-staining (red) in BeauPlex® VH treated follicles compared to vehicle.

dsm-firmenich  
own study



## Hair matrix keratinocytes proliferation



76% increase of hair matrix keratinocytes proliferation with 0.1% BeauPlex® VH

\*Helps prevent hair loss / Drug claim in some regions

# BeauPlex® VH

## Study Design / Hair Loss\*

### Target group

- 18–65 y.o. (mean 45 y.o.)

### 30 Volunteers per formulation

- Placebo
- BeauPlex® VH 1.5%

**Application: 5 months  
daily, scalp, leave-on**

**Randomized single centre  
Study  
Double blind**

\*Helps prevent hair loss / Drug claim in some regions



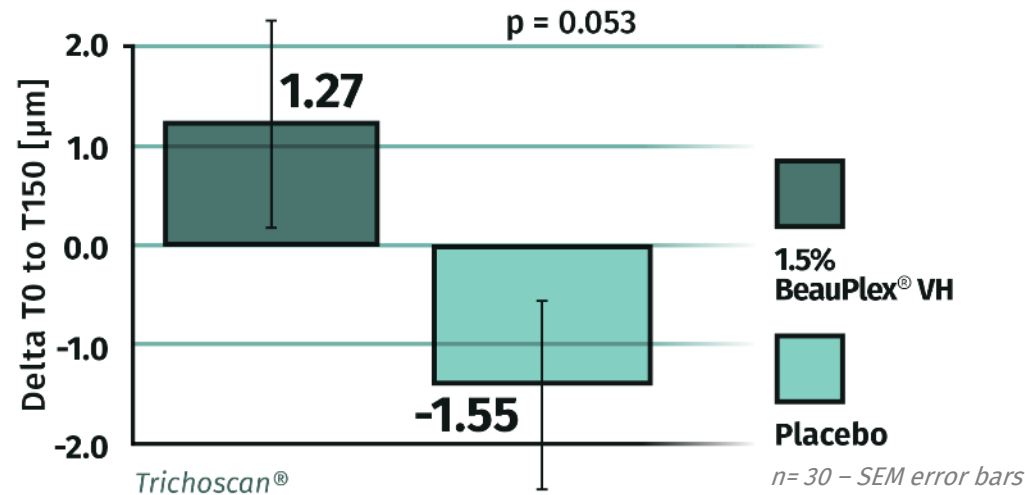
# BeauPlex® VH

Increases hair thickness and density

dsm-firmenich  
own study

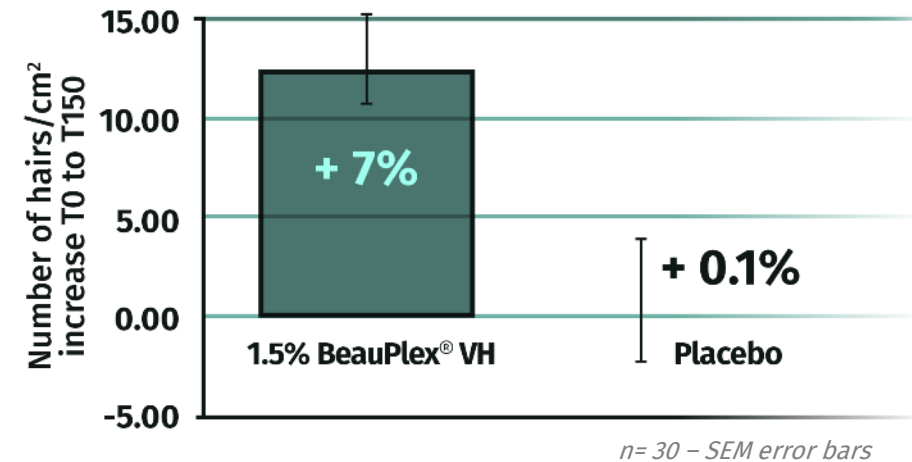


## Hair Thickness



4% Increase of hair diameter using Vitamin blend BeauPlex® VH , while hair thinning is observed with the Placebo Leave-on after 5 months treatment

## Hair Density

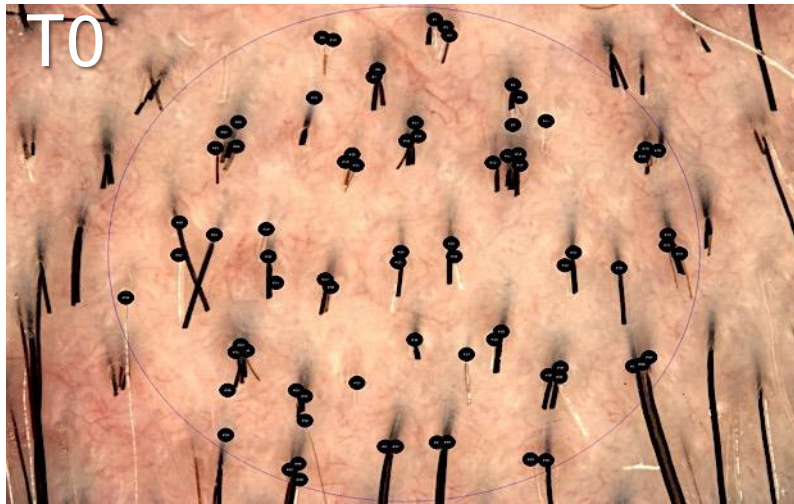


7% increase in hair density versus T0 using BeauPlex® VH

Better performance than Placebo after 5 months

# BeauPlex® VH – Hair Density

## Increases density after 5 months/ micro-images

dsm-firmenich   
own study

Example : Volunteer #49



t0 = 128 hairs/cm2 and at t150 = 164 hairs/cm2

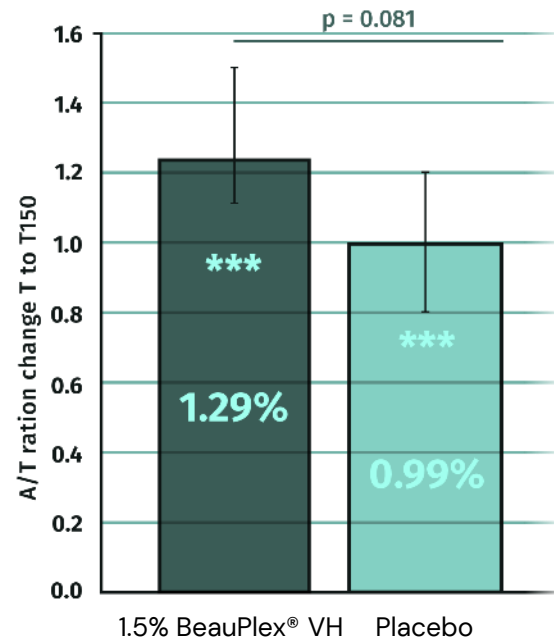
28% increase on hair density after 5-months treatment with BeauPlex® VH (example #49)

# BeauPlex® VH

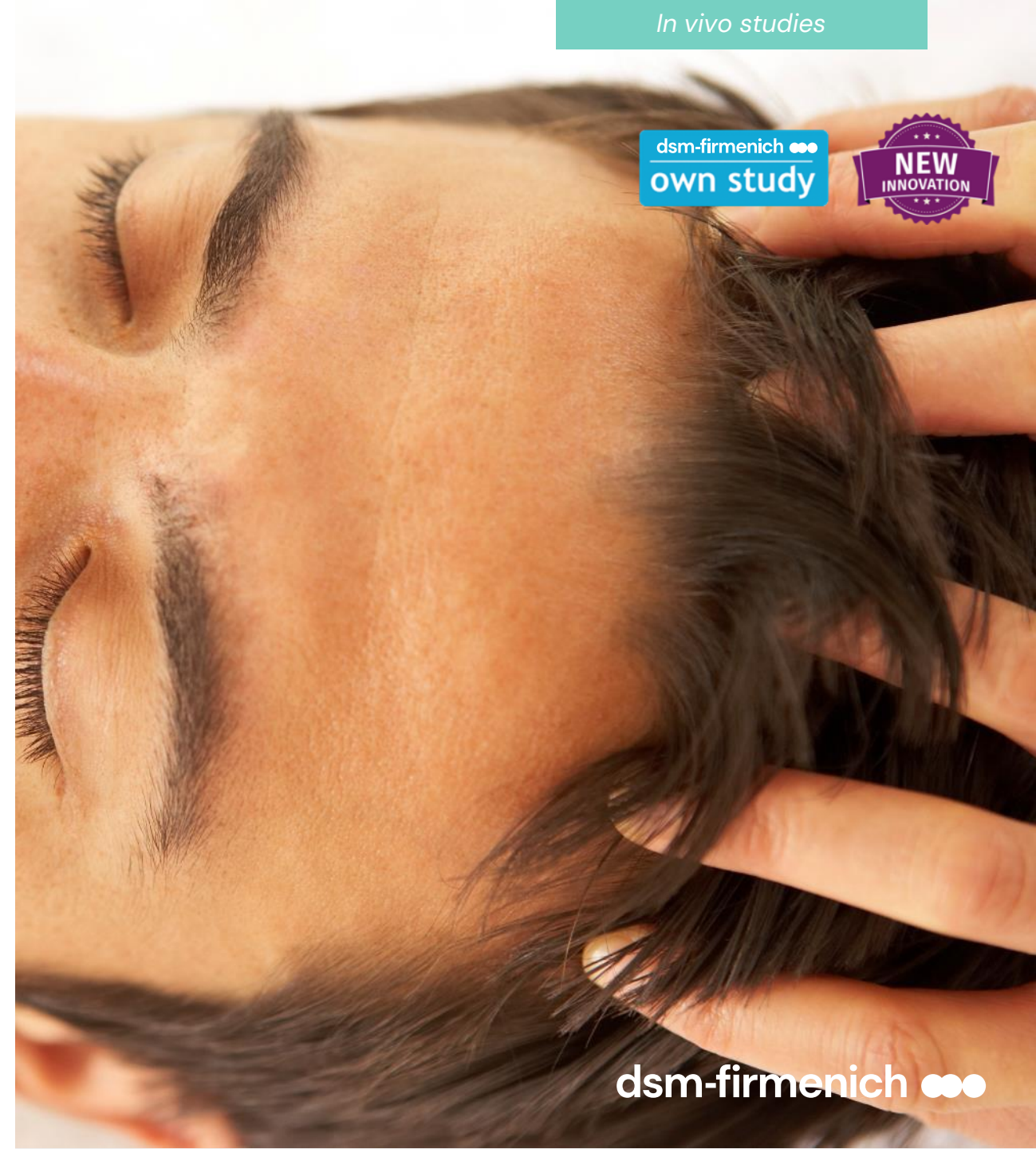
Prolongates anagen phase of hair follicles

## Anagen to Telogen ratio (A/T) – Trichogram

Trend for higher proportion of hair in anagen phase using a serum with BeauPlex® VH after 5 months



n= 30 – SEM error bars\*\*\*p < 0.001 vs T0  
15 to 25 hairs collected per volunteer for trichogram



dsm-firmenich  
own study



# Consumers confirm efficacy

## Participants feedback after treatment with BeauPlex® VH

dsm-firmenich  
own study



97% like the product



52% agree that the hair roots and scalp is not oily



93% noticed increased speed of hair growth



83% agree that they don't have dandruff on hair or scalp

# BeauPlex® VH

## Hair pigmentation\*



[Click to return  
to homepage](#)

\*Helps reduce the appearance of greying hair

dsm-firmenich 

## BeauPlex® VH

### Study Design / Hair pigmentation\*

#### Target group

- 18–45 y.o. (mean 39 y.O.)

#### 30 Volunteers per formulation

- Placebo
- BeauPlex® VH 1.5%

**Application: 4 months  
daily, leave-on, scalp**

**Randomized single centre  
Study  
Double blind**

\*Helps reduce the appearance of greying hair



# BeauPlex® VH – Hair Pigmentation\*

Hair pigmentation / Hair darkening

dsm-firmenich  
own study



Results after 4 months treatment Leave-on BeauPlex® VH (1.5%)

TO



T120



Example : Volunteer #60

Darker hair appearance after 4 months

7% reduction of grey hair versus T0

60% of volunteers showed improvement in hair pigmentation\* with BeauPlex® VH

\*Helps reduce the appearance of greying hair

# BeauPlex® VH

## Vitamin Blend – Takeaways

### Key features:

Blend of Vitamins for Hair & Scalp  
(Vitamin B3, B5, B6, C and E)

**Use level:** 1.5%

### Key Benefits:

**Helps prevent hair loss\*** (improves hair density and thickness )

- 76% Proliferation of hair follicle keratinocytes– *ex vivo*
- Prolongation of anagen phase of hair follicles.  
2x more than placebo– *ex vivo*
- Increases hair thickness (4%) and density (+7%) – *in vivo*
- Increase Anagen to Telogen ratio –*in vivo*

\*Drug claim in some regions  
Quality for Life™ seal that guarantees the highest standards for Quality, Reliability, Traceability, and Sustainability.

70



**Helps prevent the appearance of greying hair** (helps recover hair pigmentation)

- 7% hair greying reduction after 4 months– *in vivo*
- 60% of volunteers showed improvement in hair pigmentation with BeauPlex® VH

**Other benefits:** base on individual vitamins results

- Hydration and scalp barrier improvement
- Strong anti-oxidant properties

# 06

# Agenda

01 Market & Consumer Insights

02 dsm-firmenich Hair Care Solutions Map

03 ALPAFLOR® EDELWEISS CB

04 PENTAVITIN®

05 BeauPlex® VH

06 Other dsm-firmenich Solutions



Click on the number to get  
redirected to the chapter

# ALPAFLOR® ALP-SEBUM CB

## ID Card



|                        |                                                                                                                                                            |                                                 |                                                          |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|----------------------------------------------------------|
| Key benefit:           | Sebum Reduction (strong 5-α-reductase inhibitor)<br>Helps prevent hair loss* (based on literature)<br>Scalp Care (anti-irritation and soothing properties) |                                                 |                                                          |
| INCI name:<br>(Active) | Epilobium Fleischeri Flower/Leaf/Stem Extract                                                                                                              |                                                 |                                                          |
| Description:           | Plant extract organically cultivated                                                                                                                       |                                                 |                                                          |
| Technical:             | Form: Liquid<br>Use level: Up to 3%<br>pH of use: 3.5 to 5.5                                                                                               | Preservative: Free<br>Solubility: Water soluble | Target: Scalp<br>Biodegradability: Readily biodegradable |

Registration certification



\*Drug claim in some regions

# ALPAFLOR® ALP-SEBUM CB

## Organic and sustainable alpine flower

dsm-firmenich own study

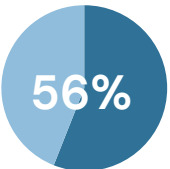


### Key Features

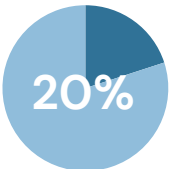
Unique glacier willowherb species, *Epilobium fleischeri*, sustainably, fairly and organically cultivated

### Benefits

Sebum Reduction extrapolation from skin Inhibits formation of DHT via 5- $\alpha$ -reductase (*ex vivo*)



less sebum production after 2 months (*in vivo*)

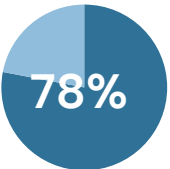


sebum reduction in 4 weeks (*in vivo*)

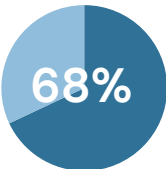
Helps prevent hair loss\* based on literature

- Inhibits formation of DHT via 5- $\alpha$ -reductase
- DHT is also known to promote hair Loss

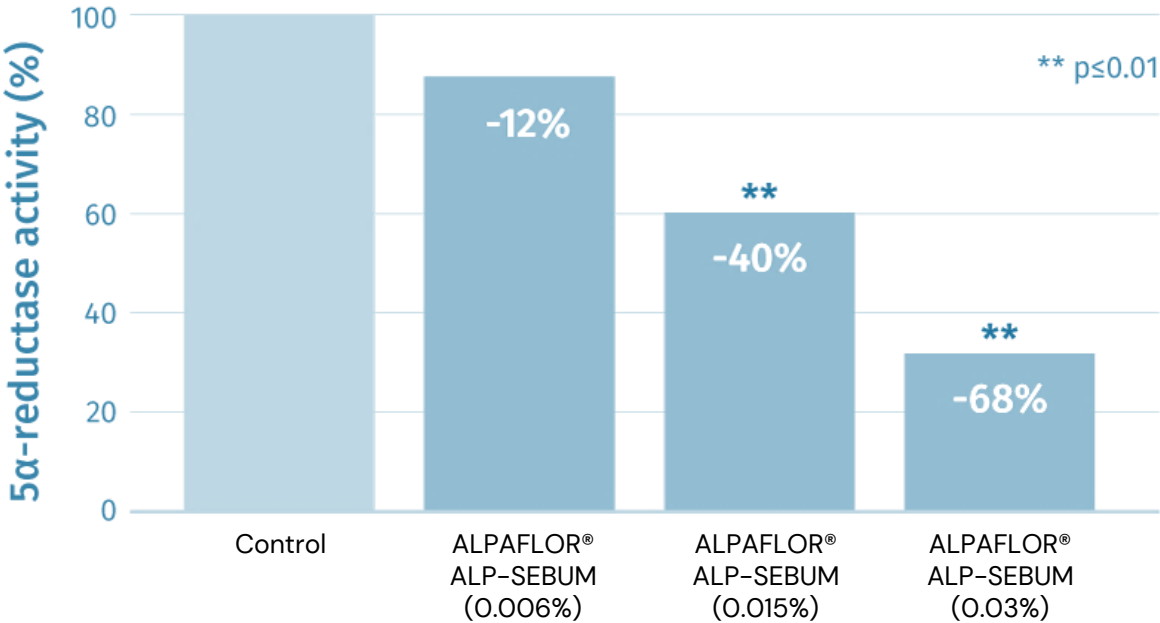
### Scalp Care



decrease on production of pro-inflammatory cytokines IL 8 with 0.075% ALPAFLOR® ALP-SEBUM\* - *in vitro*



Significant dose-dependent inhibition of 5- $\alpha$ -reductase activity up to 68% versus control with 0.03% ALPAFLOR® ALP-SEBUM\* in human skin fibroblast



Measuring the levels of 5- $\alpha$ -dihydrotestosterone (5 $\alpha$ -DHT) produced by human skin fibroblasts incubated with testosterone

\*Drug claim in some regions  
DHT= Dihydrotestosterone.  
\* = commercial form

# ARGAN OIL

## ID Card



|              |                                                                       |                                                                                                                       |
|--------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Key benefit: | Anti-breakage<br>Anti-Frizz<br>Conditioning / Ease of Combing         | Split-ends Reduction<br>Shine                                                                                         |
| INCI name:   | Argania Spinosa Kernel Oil                                            |                                                                                                                       |
| Description: | Organically cultivated and cold extracted without the use of solvents |                                                                                                                       |
| Technical:   | Form: Liquid<br>Use level: Up to 0.5%<br>pH of use: 5 to 9            | Preservative: Free<br>Solubility: Oil soluble<br>Target: Hair fiber<br>Biodegradability: Expected to be Biodegradable |

Registration certification

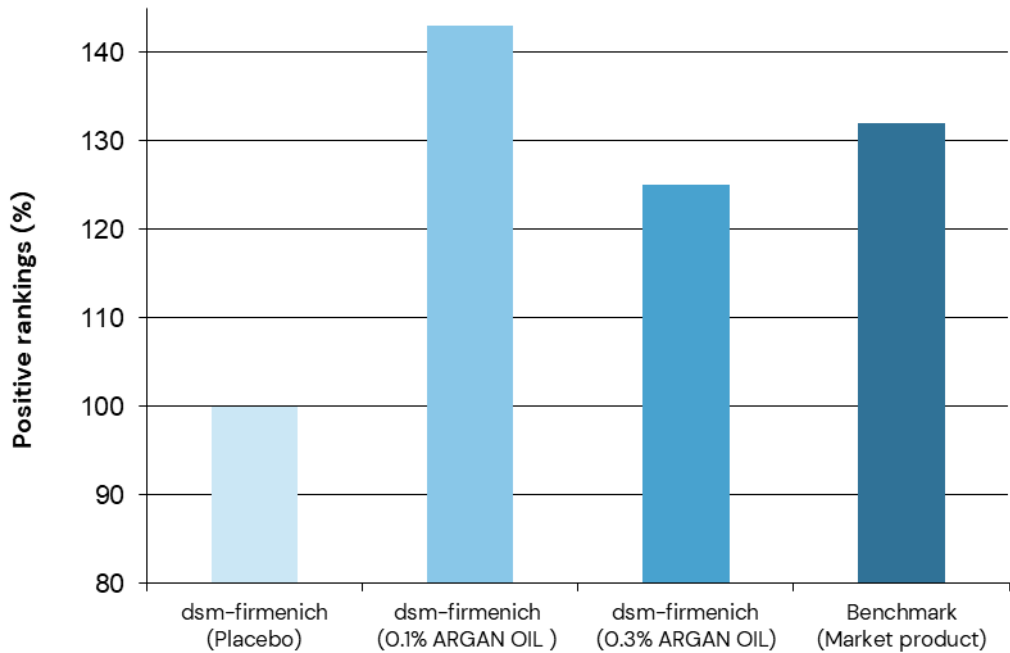


# ARGAN OIL

## Enhances Shine

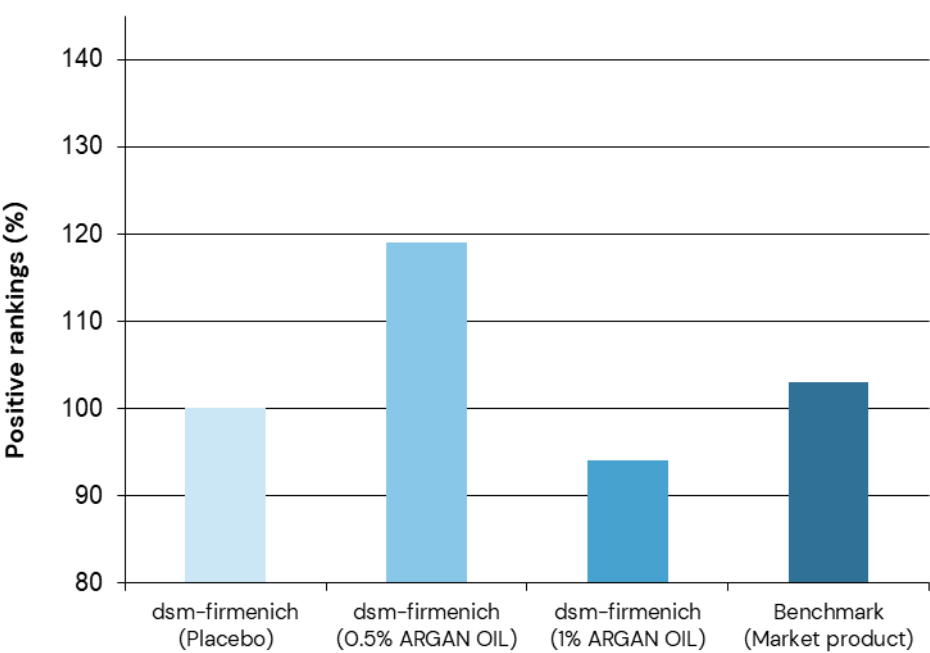


Shampoo Ranking of paired comparison test



Shampoo formulation containing 0.1% ARGAN OIL shows best shine enhancement beating the leading market brand.

Conditioner Ranking of paired comparison test



Conditioner formulation containing 0.5% ARGAN OIL shows best shine enhancement beating the leading market brand.

# COLHIBIN CB

## ID Card



|                        |                                                                                                                                 |                                                                   |                                                                      |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|----------------------------------------------------------------------|
| Key benefit:           | Anti-breakage<br>Conditioning / Ease of Combing<br>Split-ends reduction                                                         |                                                                   |                                                                      |
| INCI name:<br>(Active) | Hydrolyzed Rice Protein                                                                                                         |                                                                   |                                                                      |
| Description:           | COLHIBIN CB is a highly concentrated mixture of natural peptides with low molecular weights, extracted from edible rice protein |                                                                   |                                                                      |
| Technical:             | Form: Liquid<br>Use level: Up to 3%<br>pH of use: 3 to 9                                                                        | Preservative:<br>Phenoxyethanol-free<br>Solubility: Water soluble | Target: Hair fiber<br>Biodegradability: Expected to be Biodegradable |

Registration certification



# COLHIBIN CB

## Plant derived peptide

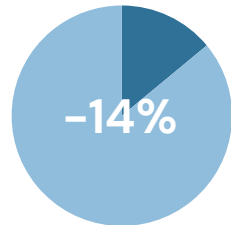
dsm-firmenich   
own study



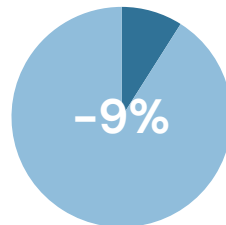
### Shampoo

#### Reduction in Combing Force

Wet

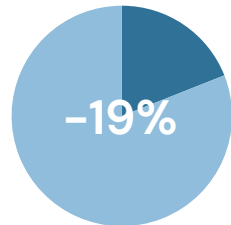


1 Cycle

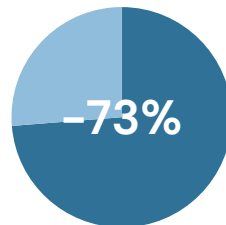


3 Cycles

Dry



1 Cycle

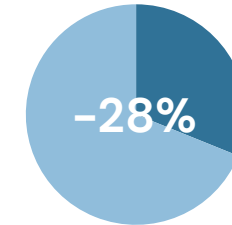


3 Cycles

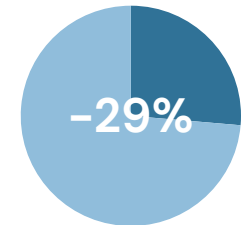
### Hair Fibers vs Placebo

### Leave-on single application

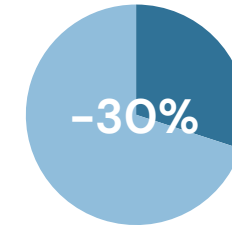
Hair Breakage  
Reduction



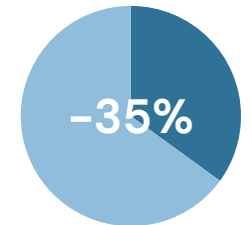
Split Ends Reduction  
(dry combing force at tips)



Reduction in Combing Force



Wet



Dry

Instron Bleached Caucasian hair Breakage: repeated combing test COLHIBIN CB at 3% as supplied

# life'sGLA™ '10' n-6 Oil

## ID Card



|                        |                                                                                          |                                                                                                                |
|------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| Key benefit:           | Anti-breakage<br>Anti-Frizz<br>Conditioning / Ease of Combing                            | Split-ends Reduction<br>Shine                                                                                  |
| INCI name:<br>(Active) | Oenothera Biennis (Evening Primrose) Seed Extract                                        |                                                                                                                |
| Description:           | Prepared by extraction of oil from seeds of Oenothera plant or Evening primrose (9% GLA) |                                                                                                                |
| Technical:             | Form: Liquid<br>Use level: up to 8%<br>pH of use: 3 to 9                                 | Preservative: Free<br>Solubility: Oil soluble<br>Target: Hair fiber<br>Biodegradability: Readily biodegradable |

Registration certification



# *life'sGLA*™ '10' n-6 Oil (Omega-6 flower oil)

Prepared by extraction of oil from seeds of *Oenothera* plant or Evening Primrose (9% GLA)

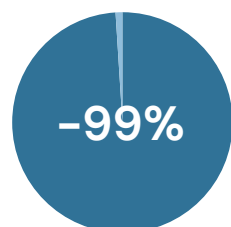
dsm-firmenich  
own study



## Hair Fibers vs Placebo Leave-on

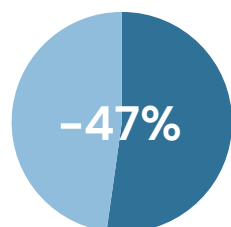
Hair **Breakage**  
Reduction

**Split Ends** Reduction  
(dry combing force at tips)

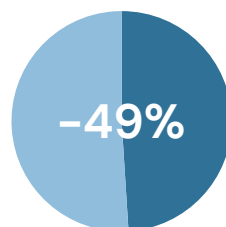


1 Cycle

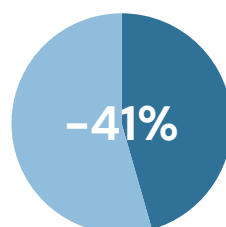
Reduction in **Combing Force**



Wet



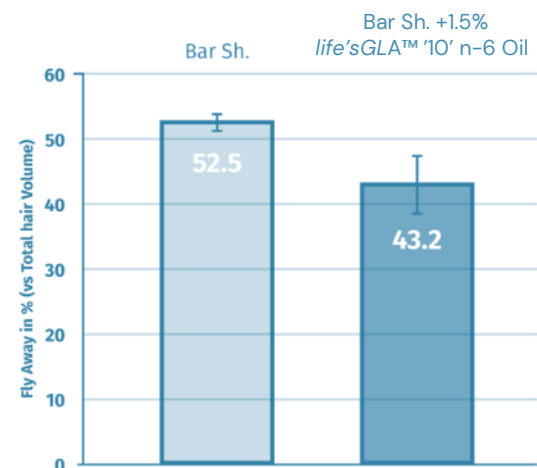
3 Cycles



Dry

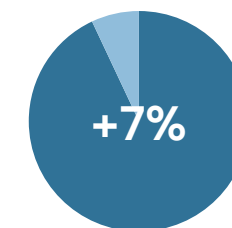
Instron-Bleached Caucasian/ Breakage: repeated combing test *life'sGLA*™ '10' n-6 Oil at 1%

## Anti-Frizz Solid Shampoo



Bleached Caucasian *life'sGLA*™ '10' n-6 Oil at 1.5%

## Shine Shampoo



Increase of **Shine**

Bossa Nova -Virgin Asian hair *life'sGLA*™ '10' n-6 Oil at 0.5%

# PHYTALURONATE® PF

## ID Card



|                        |                                                                         |                                                                                    |                                                       |
|------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------|
| Key benefit:           | Anti-breakage<br>Conditioning / Ease of Combing<br>Split-ends reduction |                                                                                    |                                                       |
| INCI name:<br>(Active) | Ceratonia Siliqua (Carob) Gum                                           |                                                                                    |                                                       |
| Description:           | Derived from the seeds of Carob tree.                                   |                                                                                    |                                                       |
| Technical:             | Form: Liquid<br>Use level: Up to 3%<br>pH of use: 3 to 10               | Preservative: Phenoxyethanol and<br>Ethyhexylglycerin<br>Solubility: Water soluble | Target: Hair fiber<br>Biodegradability: Biodegradable |

Registration  
certification



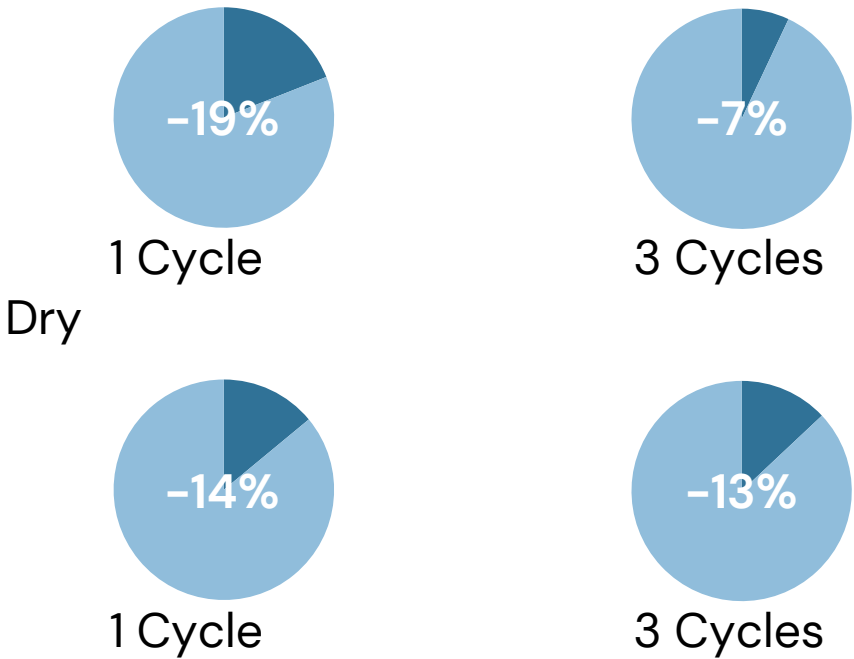
# PHYTALURONATE® PF

Plant derived from the seeds of Carob tree



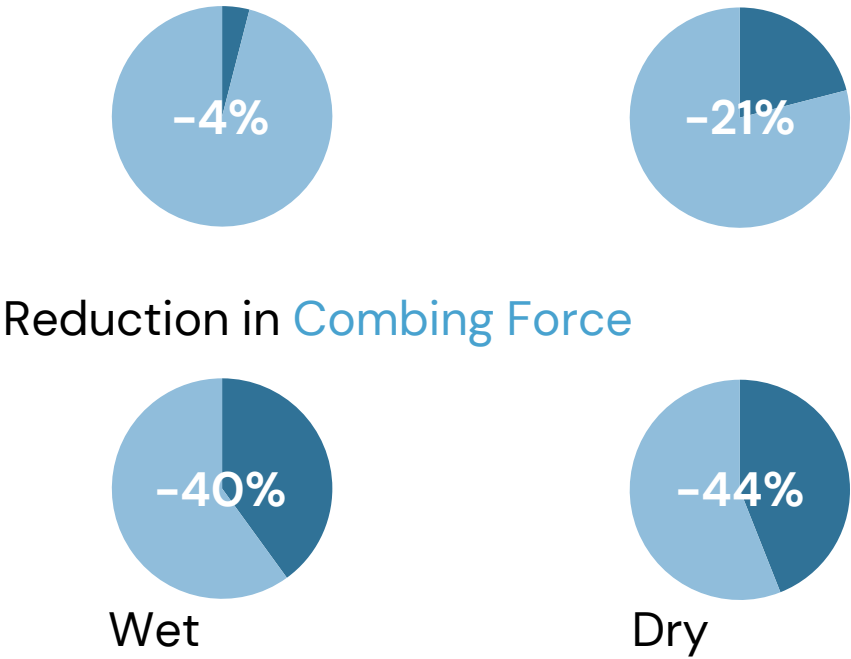
## Shampoo

Reduction in **Combing Force**  
Wet



## Leave-on single application

Hair **Breakage** Reduction      **Split Ends** Reduction  
(dry combing force at tips)



Instron/Bleached Caucasian hair Breakage: repeated combing test PHYTALURONATE® PF at 3% as supplied

# Phytantriol

## ID Card



|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                    |                                                       |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------|
| Key benefit:               | Color Protection<br>Hair Protection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Heat Protection<br>Deposition (Panthenol, Ethyl-Panthenol and Keratin amino acids) |                                                       |
| INCI name:                 | Phytantriol                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Product code:<br>0429082                                                           |                                                       |
| Description:               | Prepared from Isophytol, one of the central building blocks of vitamin E                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                    |                                                       |
| Technical:                 | Form: Viscous Liquid<br>Use level: 0.1% to 1%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Preservative: Free<br>Solubility: Oil soluble                                      | Target: Hair fiber<br>Biodegradability: Biodegradable |
| Registration certification |       |                                                                                    |                                                       |

# Phytantriol

biodegradable and biomimetic to hair layer

## Key Features:

Consist of an anchoring groups for an excellent substantivity to hair ("Glycerin like" head) and a tail that is similar to the 18-MEA layer, a primary lipid of the hair surface

## Benefits:

### Deposition -0.1%

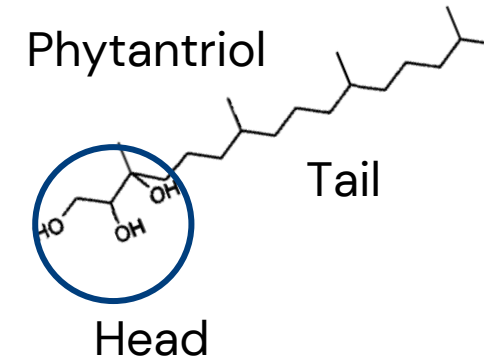
Boosts effects of Panthenol, Ethyl-Panthenol and keratin amino acids

### Heat Protection- 0.1%-0.5%

Protection against heat damage (shampoos and conditioners)

### Color Protection -0.2%

Visible prevention of wash-out from various color shades



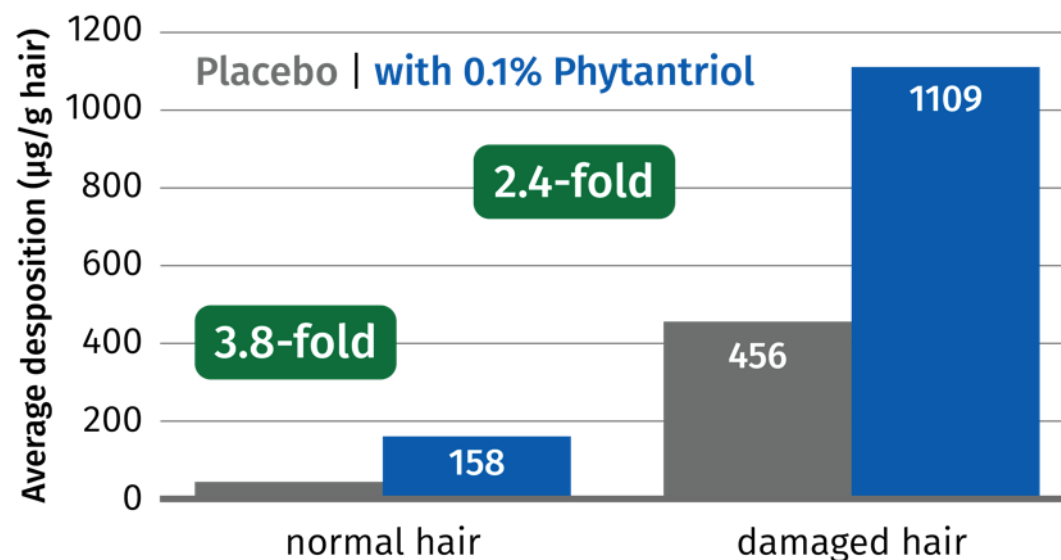


# Phytantriol

## Increases the deposition of Panthenol and Keratin amino acids (Shampoo)

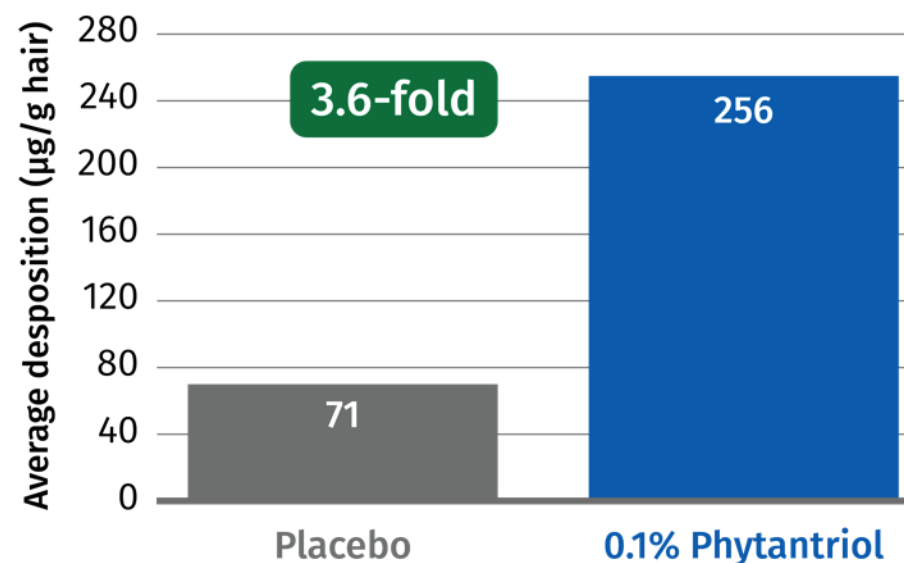
### Panthenol

Virgin and damage hair swatches soaked for 10 minutes in a 50% shampoo solution with **0.5% Panthenol**. Rinsed 3 times with water (50°C) and air dried. Hair was dissolved, analyzed with a scintillation counter and amounts calculated.



### Keratin amino acids

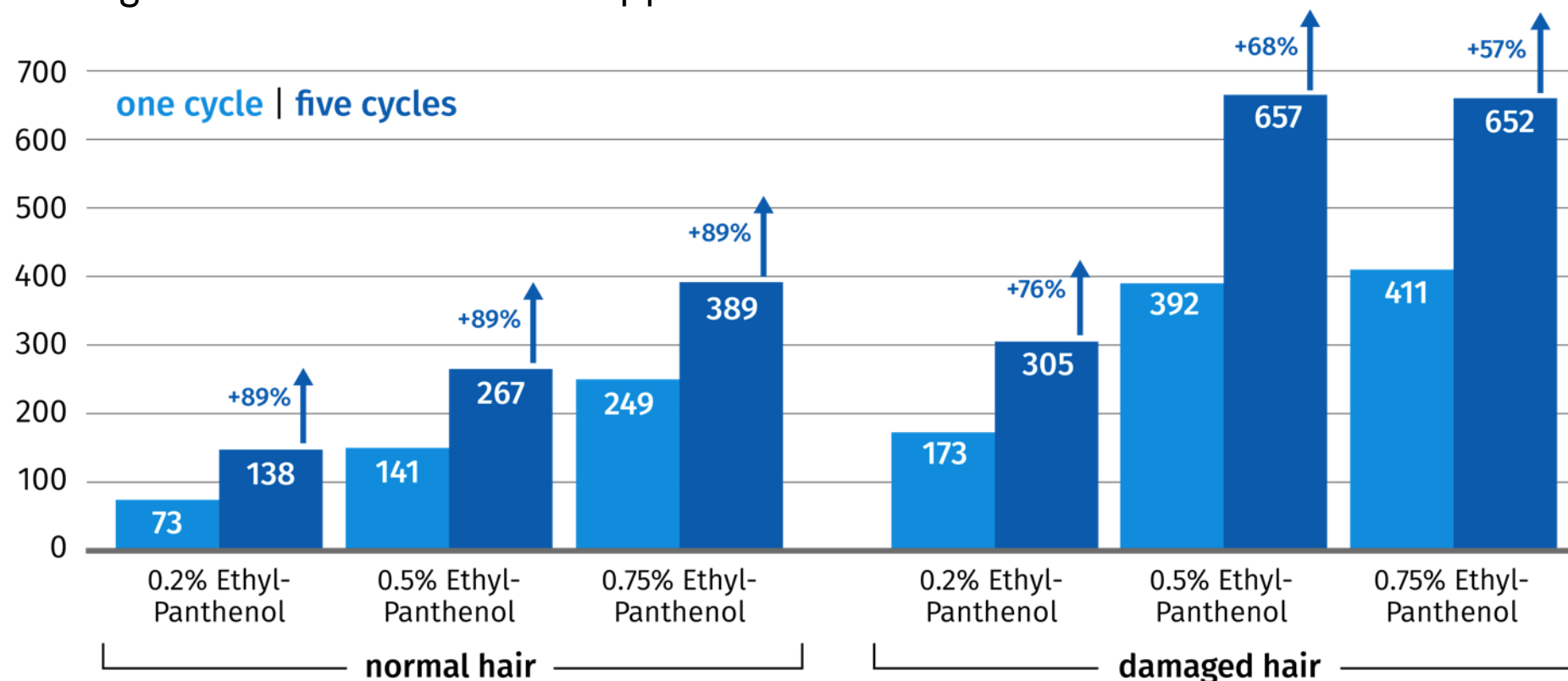
Virgin hair swatches soaked for 10 minutes in a 50% shampoo solution with **0.5% labeled keratin amino acids**. Rinsed 3 times with warm water (50°C) and air dried. Hair was dissolved, analyzed with a scintillation counter and amounts calculated.



# Phytantriol

## Increases the deposition of Ethyl-Panthenol on normal and damage hair (Shampoo)

Phytantriol strongly increases the deposition of Ethyl-Panthenol on both normal and damaged hair after cumulative application.

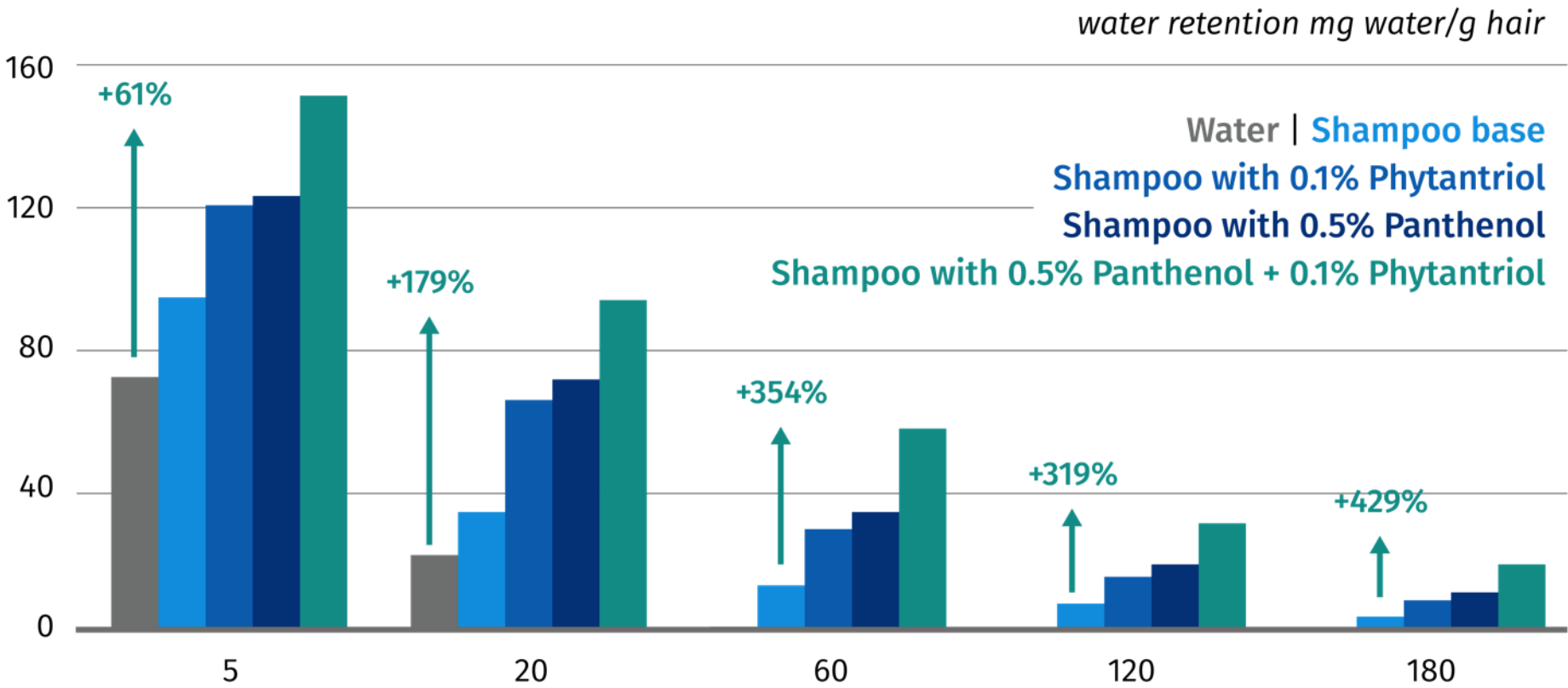


# Phytantriol

## Improves water content in the hair (Shampoo)



Dilution of shampoo with water at 1:10. Hair soaked in solution, rinsed twice with water and blotted with tissue paper. Analysis of water loss gravimetrically.





# Phytantriol

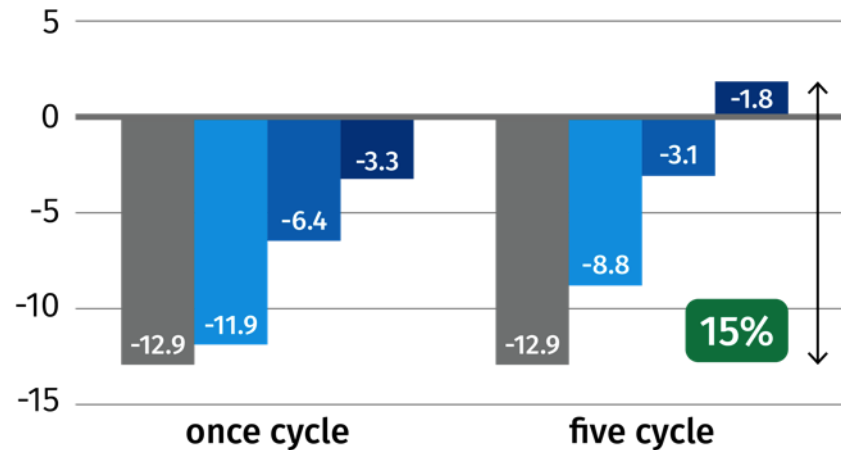
## Protects hair from damage caused by blow drying (Shampoo)

### Normal Hair

Virgin brown hair swatches (5/group) were pre-treated and hot blow dried for 2min. Assessment of tensile strength (yield slope) with a force of 20gm load setting at a speed of 100mm/min.

#### % change vs. no treatment

No treatment | Placebo shampoo  
0.3% Phytantriol | 0.5% Phytantriol

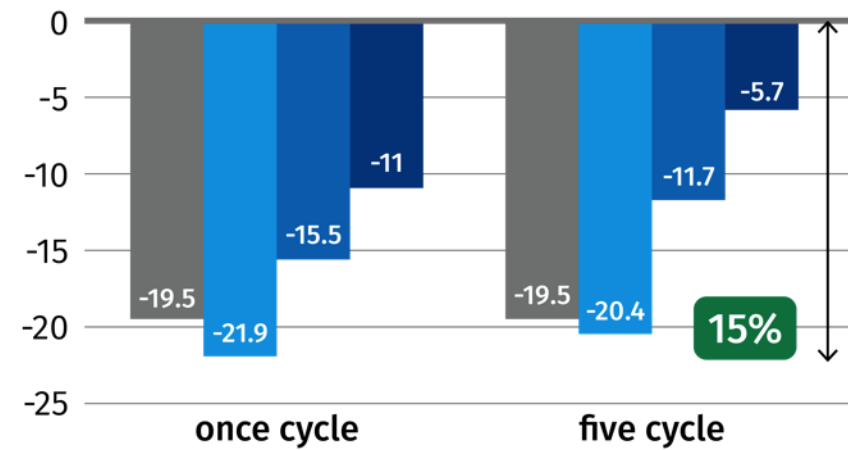


### Damaged Hair

Bleached brown hair swatches (5/group) were pre-treated and hot blow dried for 2min. Assessment of tensile strength (yield slope) with a force of 20gm load setting at a speed of 100mm/min.

#### % change vs. no treatment

No treatment | Placebo shampoo  
0.3% Phytantriol | 0.5% Phytantriol





# Phytantriol

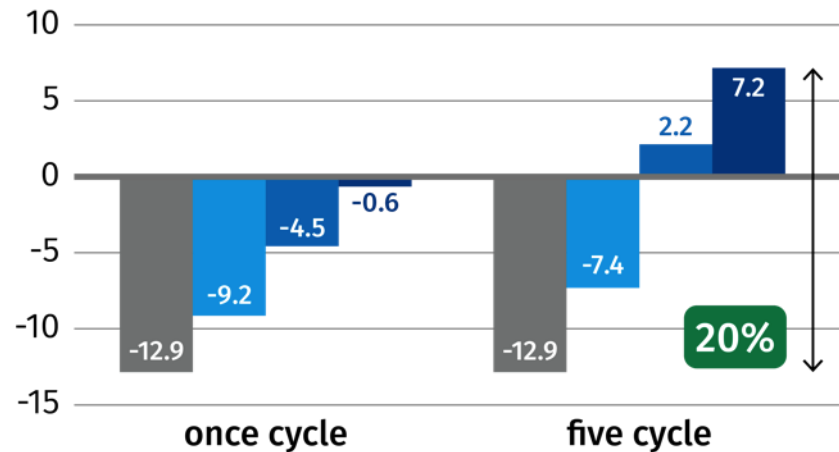
## Protects hair from damage caused by blow drying (Conditioner)

### Normal Hair

Virgin brown hair swatches (5/group) were pre-treated and hot blow dried for 2min. Assessment of tensile strength (yield slope) with a force of 20gm load setting at a speed of 100mm/min.

#### % change vs. no treatment

No treatment | Placebo conditioner  
0.3% Phytantriol | 0.5% Phytantriol

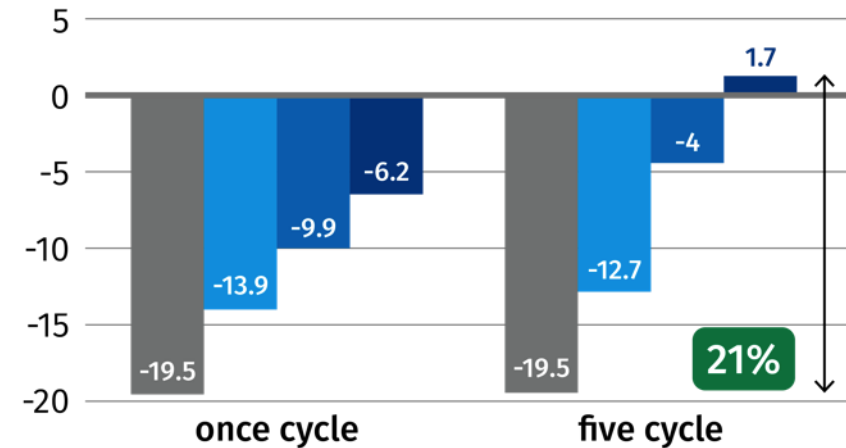


### Damaged Hair

Bleached brown hair swatches (5/group) were pre-treated and hot blow dried for 2min. Assessment of tensile strength (yield slope) with a force of 20gm load setting at a speed of 100mm/min.

#### % change vs. no treatment

No treatment | Placebo conditioner  
0.3% Phytantriol | 0.5% Phytantriol



# Phytantriol

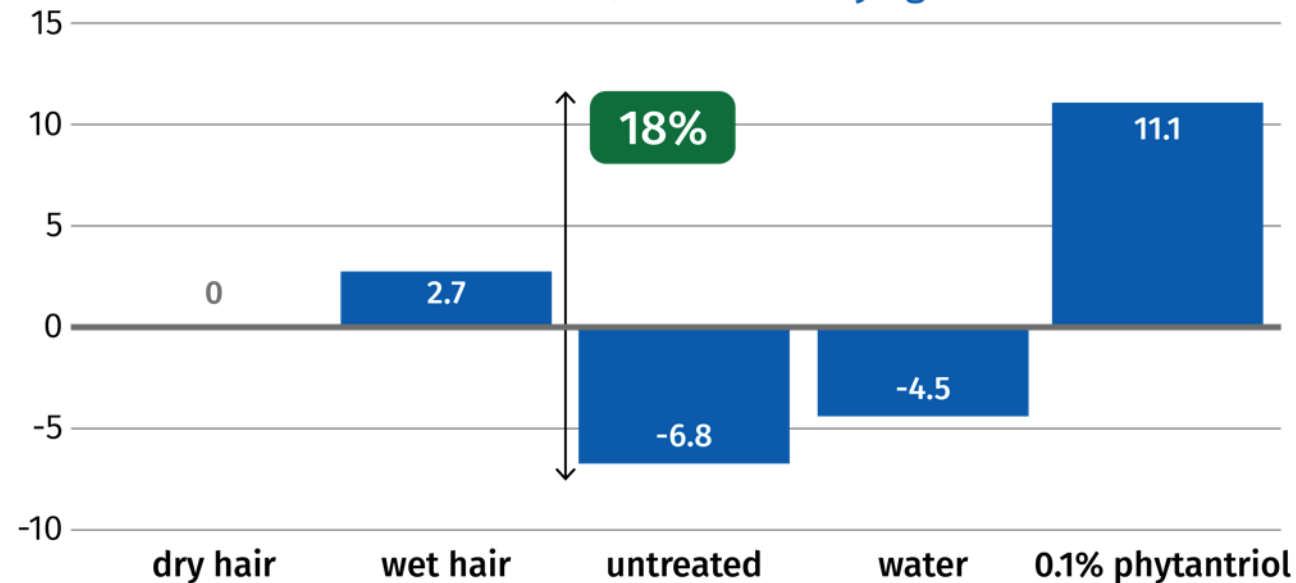
Protects hair from damage caused by blow drying (Leave on)

## Normal Hair

Virgin brown hair swatches (5/group) were pre-treated and hot blow dried for 2min. Assessment of tensile strength (yield slope) with a force of 20gm load setting at a speed of 100mm/min.

### % change vs. no treatment

Untreated | After blow drying

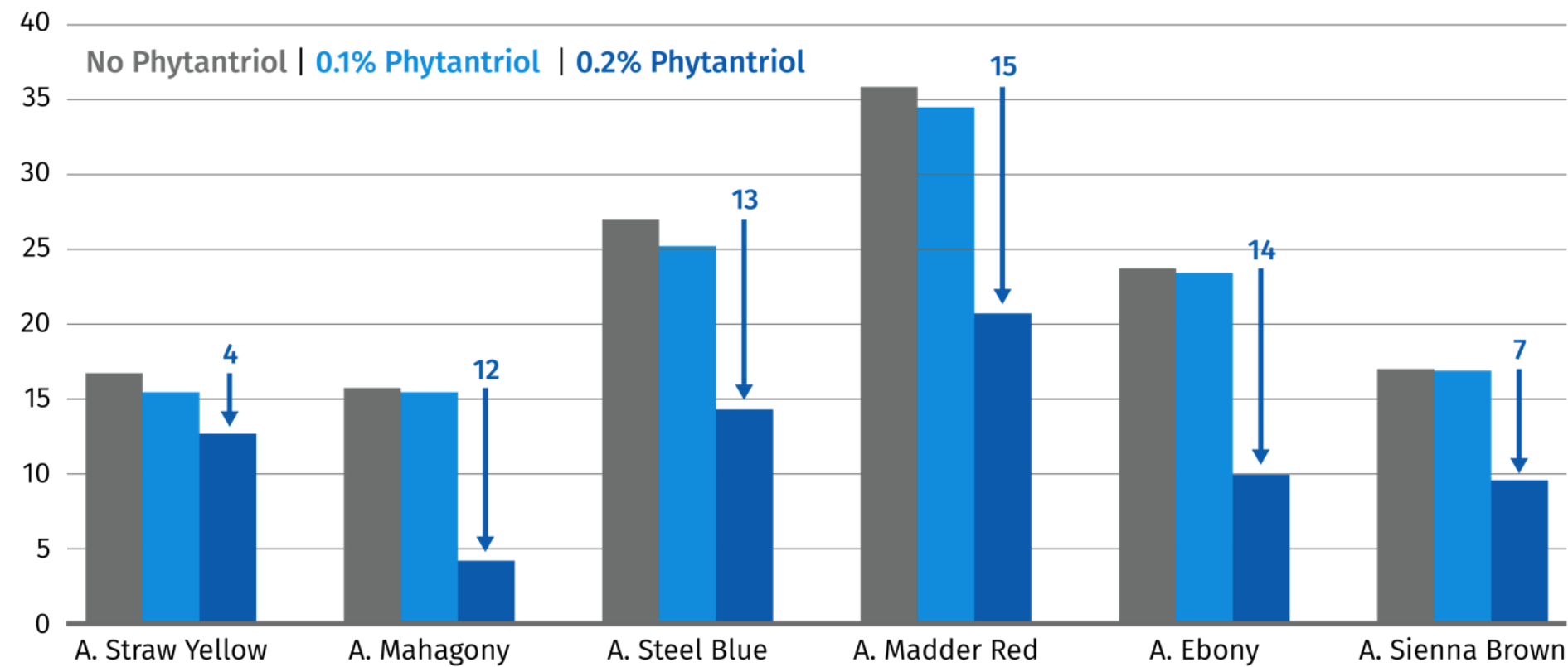


# Phytantriol

## Protects different hair colors from wash-out



Direct dyes commonly used in non-oxidative colorations and color mousses. Differences in  $\Delta E$  greater than 2 are visible by eye.



# SETAKOL® PF

## ID Card



|                        |                                                                         |                                                                                    |                                                           |
|------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----------------------------------------------------------|
| Key benefit:           | Anti-breakage<br>Conditioning / Ease of Combing<br>Split-ends reduction |                                                                                    |                                                           |
| INCI name:<br>(Active) | Hydrolyzed Sericin                                                      |                                                                                    |                                                           |
| Description:           | Hydrolyzed silk glycoprotein sericin                                    |                                                                                    |                                                           |
| Technical:             | Form: Viscous Liquid<br>Use level: Up to 3%<br>pH of use: 5 to 9        | Preservative: Phenoxyethanol and<br>Ethyhexylglycerin<br>Solubility: Water soluble | Target: Hair fiber<br>Biodegradability: No data available |

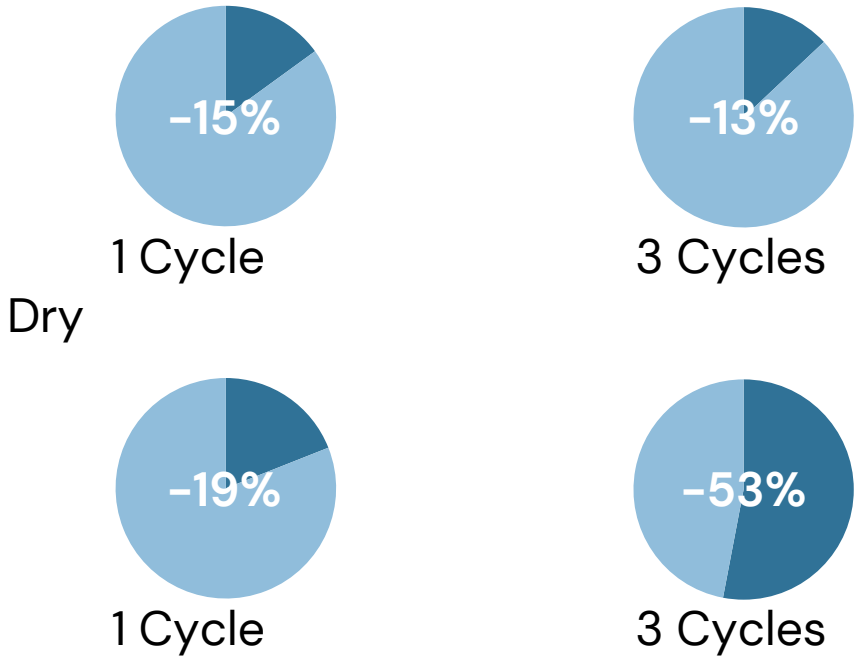
Registration certification



SETAKOL® PF  
Hydrolyzed silk glycoprotein sericin

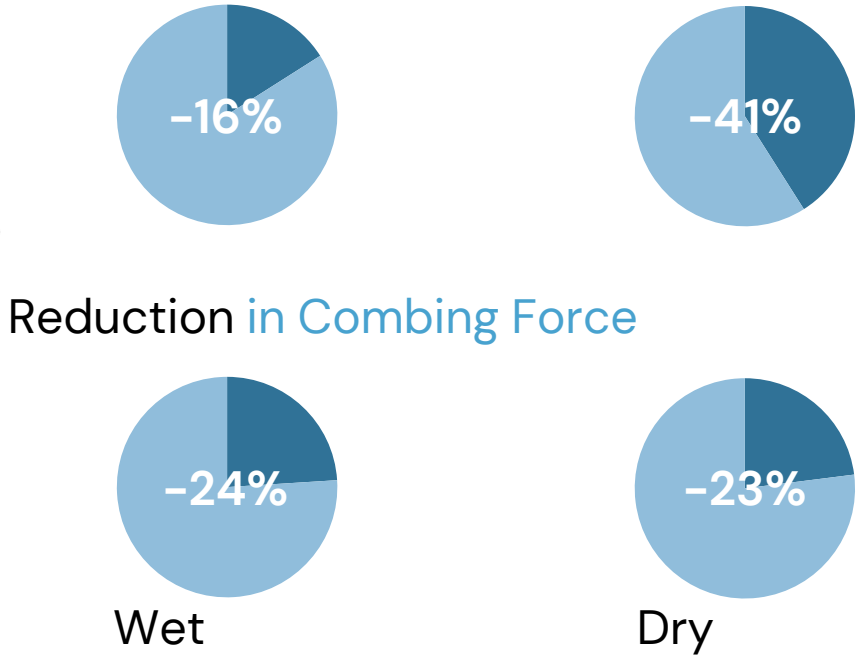


Shampoo  
Reduction in Combing Force  
Wet



Hair Fibers vs Placebo

Leave-on single application  
Hair Breakage Reduction  
Split Ends Reduction  
(dry combing force at tips)



Instron Breakage: repeated combing test Bleached Caucasian hair SETAKOL® PF at 3% as supplied

# STIMU-TEX® AS

## ID Card



|              |                                                                                                                                                                           |                                                 |                              |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|------------------------------|
| Key benefit: | Anti-breakage                                                                                                                                                             | Split-ends reduction                            |                              |
|              | Anti- frizz                                                                                                                                                               | Scalp Care (reduces itchiness and irritation) – |                              |
|              | Conditioning / Ease of combing                                                                                                                                            | extrapolation from skin results                 |                              |
| INCI name:   | Tocopherol, Argania Spinosa Kernel Oil, Spent Grain Wax, Butyrospermum Parkii Butter Extract                                                                              |                                                 |                              |
| Description: | A unique mixture of high-quality, upcycled spent grain wax, cold-processed argan oil, and shea butter. With upcycled spent grain wax, a by-product of the beer production |                                                 |                              |
| Technical:   | Form: Off white to yellow lipidic mas                                                                                                                                     | Preservative: Free                              | Target: Hair fiber and scalp |
|              | Use level: Up to 3%                                                                                                                                                       | Solubility: Oil soluble                         |                              |

Registration certification



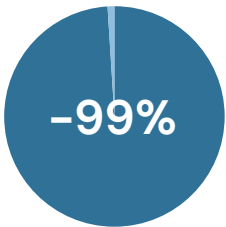
# STIMU-TEX® AS

Blend of spent grain wax from upcycling process with argan oil and shea butter

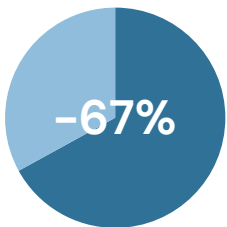


## Leave-on single application

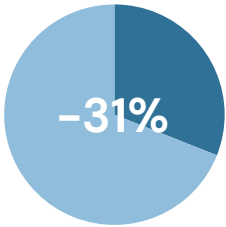
Hair Breakage Reduction



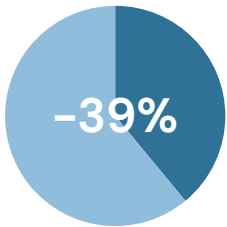
Split Ends Reduction (dry combing force at tips)



Reduction in Combing Force

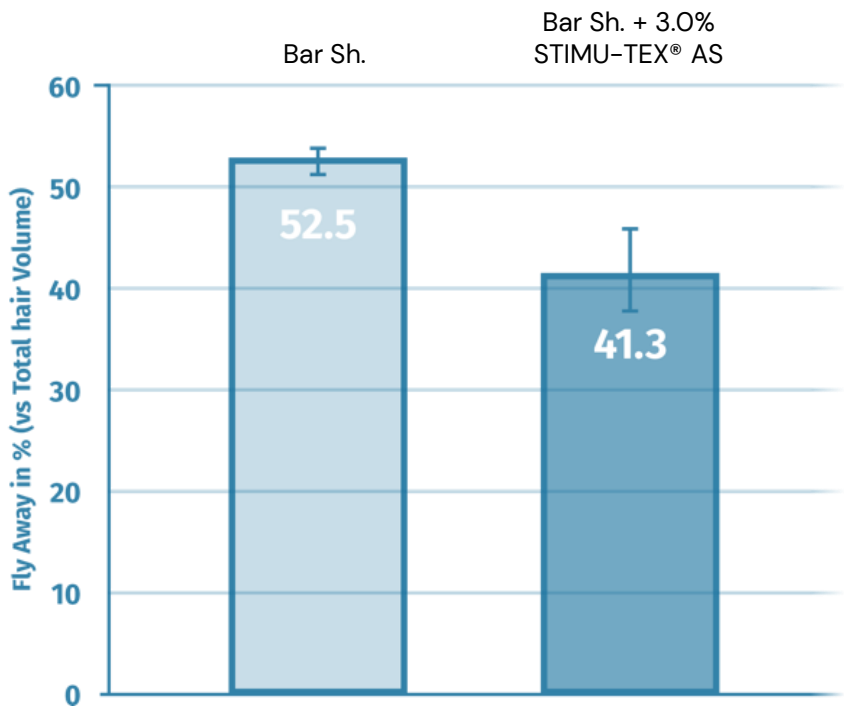


Wet



Dry

## Anti-frizz Solid Shampoo



Instron/ Breakage: repeated combing test Bleached Caucasian hair/ STIMU-TEX® AS at 1% as supplied  
Bleached Caucasian hair STIMU-TEX® AS at 3% as supplied

Quali-B

Vitamin B3 (Niacinamide PC)

ID Card



|              |                                                                                                                                |                                                 |                                                                         |
|--------------|--------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------|
| Key benefit: | Scalp Care (strengthens scalp barrier / moisturization)<br>Hair Thickening (helps increase hair diameter)                      |                                                 |                                                                         |
| INCI name:   | Niacinamide                                                                                                                    |                                                 |                                                                         |
| Description: | Niacinamide PC has a low guaranteed level of residual nicotinic acid to address any concerns about unpleasant scalp sensations |                                                 |                                                                         |
| Technical:   | Form: Powder<br>Use level: Up to 7%<br>pH of use: 4 to 8                                                                       | Preservative: Free<br>Solubility: Water soluble | Target: Scalp and hair fiber<br>Biodegradability: Readily biodegradable |

Registration  
certification

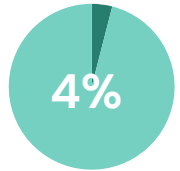


Quality for Life™ seal that guarantees the highest standards for Quality, Reliability, Traceability, and Sustainability.

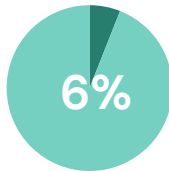
# Quali-B Vitamin B3 (Niacinamide PC)

Penetrates the hair and contributes to thicken & strength the fiber

Significantly increases fibre diameter\*

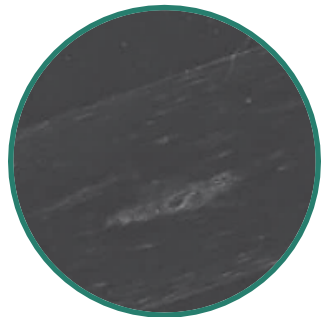


Virgin & Fine textured hair

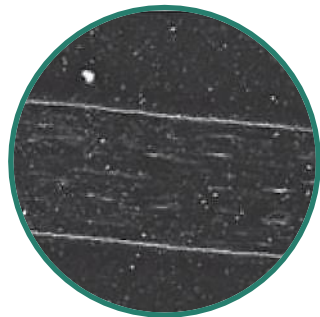


Bleached Hair & Coarse hair

White represents Niacinamide penetrated and deposited on the surface of the hair fiber



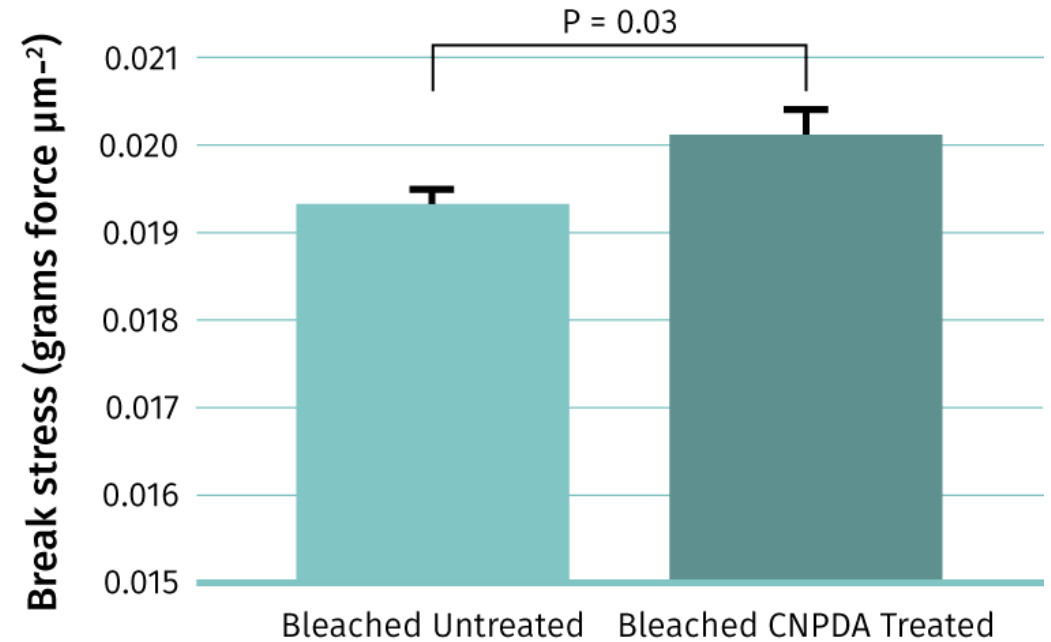
Blank



Niacinamide

Autoradiographic image with Caucasian, bleached hair.

Improves fiber resistance to breakage by ~4%\*



Fiber break stress for CNPDA Treated hair fibers at 60% relative humidity.

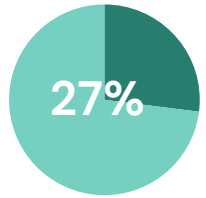
Data reported as mean + SEM.

\*Results based in the combination of Caffeine, Niacinamide, Panthenol, Dimethicone and Acrylate polymer (CNPDA)

J.H. Thomas et al., A novel cosmetic approach to treat thinning hair, British Association of Dermatologists, 2011 165 (Suppl. 3), pp24–30

# Quali-B Vitamin B3 (Niacinamide PC)

## Improves resilience for a healthier scalp



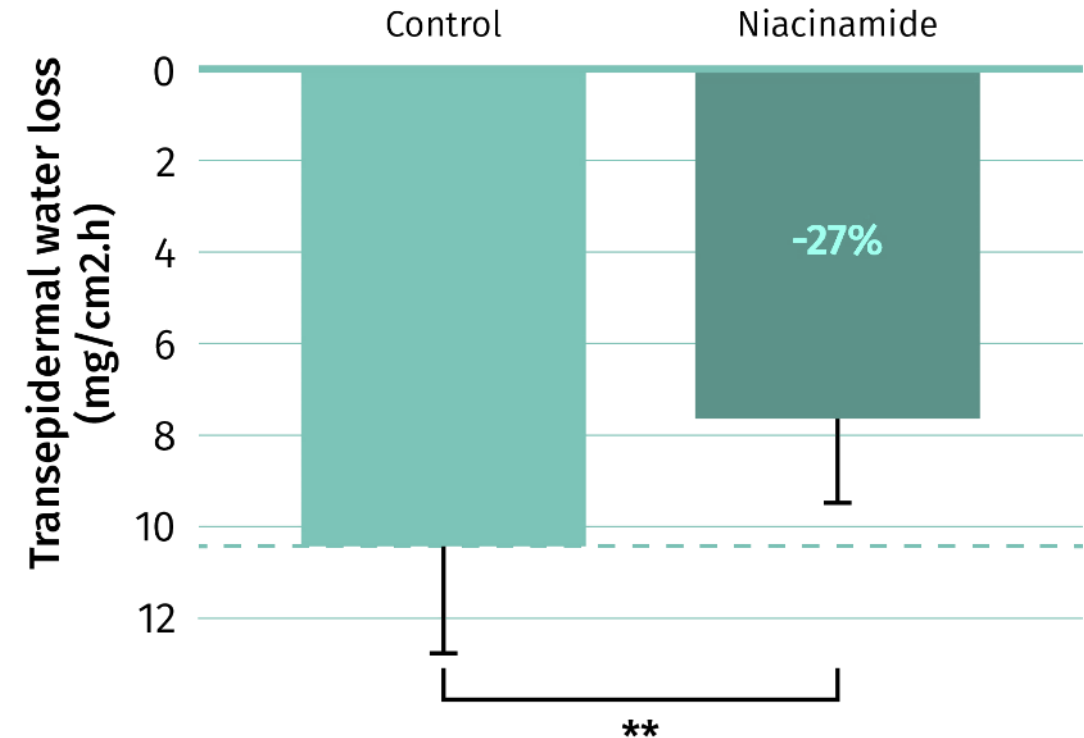
TEWL was reduced by 27% when skin was treated twice daily with Niacinamide for 4 weeks



Niacinamide PC helps to keep the scalp hydrated  
2% Niacinamide PC

### Strengthens Scalp Barrier:

-27% water loss reduction improving scalp hydration



S. Inoue, Nicotinamide increases biosynthesis of ceramides as well as other stratum corneum lipids to improve the epidermal permeability barrier, British Journal of Dermatology, 2000; 143: 524-531

# Quali-B Pro-Vitamin B5 (Panthenol)

## ID Card



|              |                                                                                                                                           |                                                                                 |                                                                         |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| Key benefit: | Scalp Care (strengthens scalp barrier / moisturization)<br>Deposition – see Phytantriol<br>Hair Thickening (helps increase hair diameter) |                                                                                 |                                                                         |
| INCI name:   | Panthenol<br>Ethyl Panthenol                                                                                                              |                                                                                 |                                                                         |
| Description: | D-Panthenol<br>D-Panthenol 75L min 75% and water                                                                                          | DL-Panthenol 50L min 50% and water/racemic mixture<br>D- and L- Ethyl Panthenol |                                                                         |
| Technical:   | Form: Liquid<br>Use level: Up to 5%<br>pH of use: 4 to 7.5                                                                                | Preservative: Free<br>Solubility: Water soluble                                 | Target: Scalp and hair fiber<br>Biodegradability: Readily biodegradable |

Registration certification\*

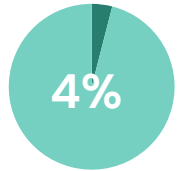


\*D-Panthenol 75L  
Quality for Life™ seal that guarantees the highest standards for Quality, Reliability, Traceability, and Sustainability.

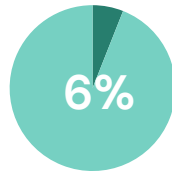
# Quali-B® Pro-Vitamin B5 (Panthenol)

Penetrates the hair and contributes to thicken & strengthen the fiber

Significantly increases fiber diameter\*

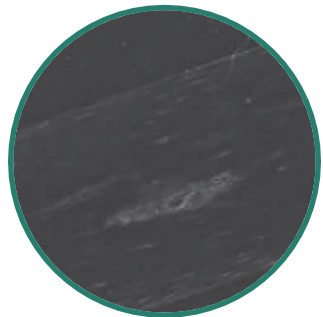


Virgin & Fine textured hair

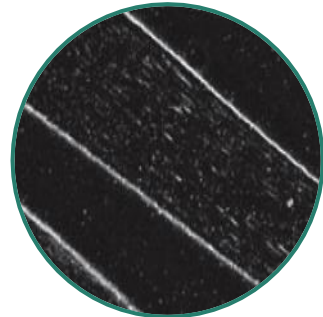


Bleached Hair & Coarse hair

White represents Panthenol penetrated and deposited on the surface of the hair fiber



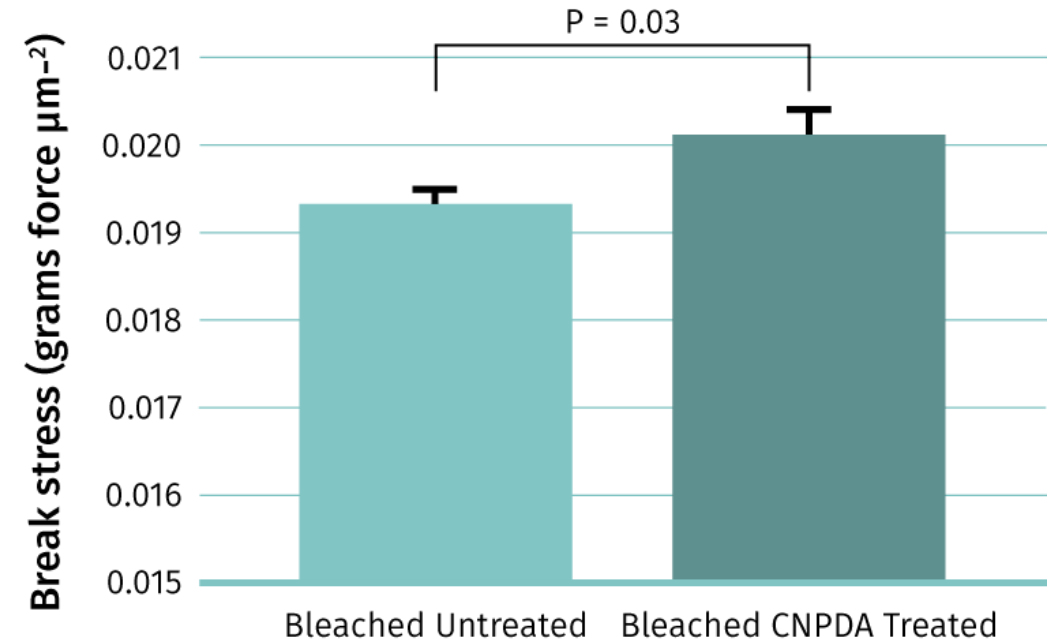
Blank



Panthenol

Autoradiographic image with Caucasian, bleached hair.

Improves fiber resistance to breakage by ~4%\*



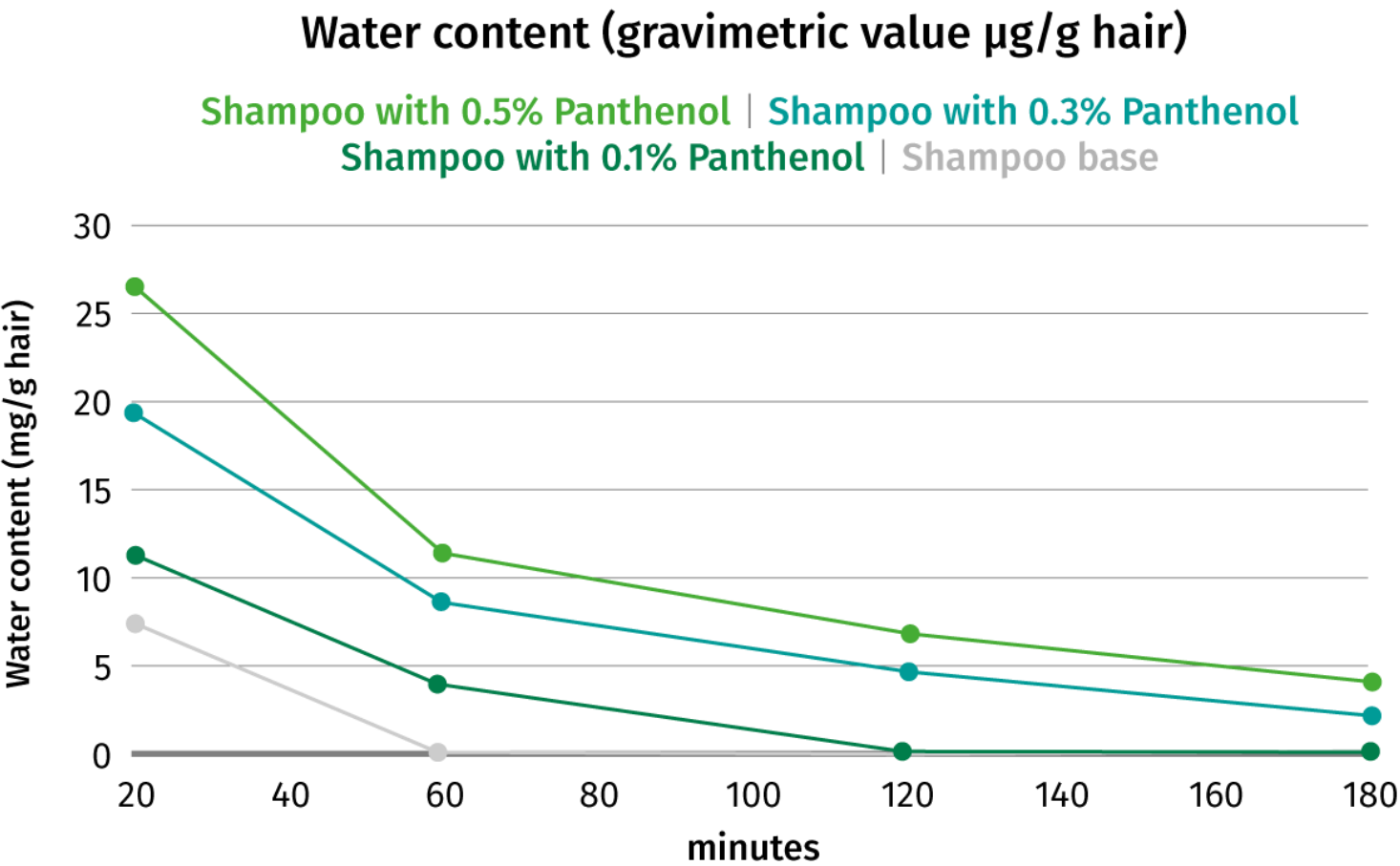
Fiber break stress for CNPDA Treated hair fibers at 60% relative humidity.

Data reported as mean + SEM.

\*Results based in the combination of Niacinamide, caffeine, Vitamin B5, dimethicone and acrylate polymer  
J.H. Thomas et al., A novel cosmetic approach to treat thinning hair,  
British Association of Dermatologists, 2011 165 (Suppl. 3), pp24-30

Quali-B<sup>®</sup> Pro-Vitamin B5 (Panthenol)

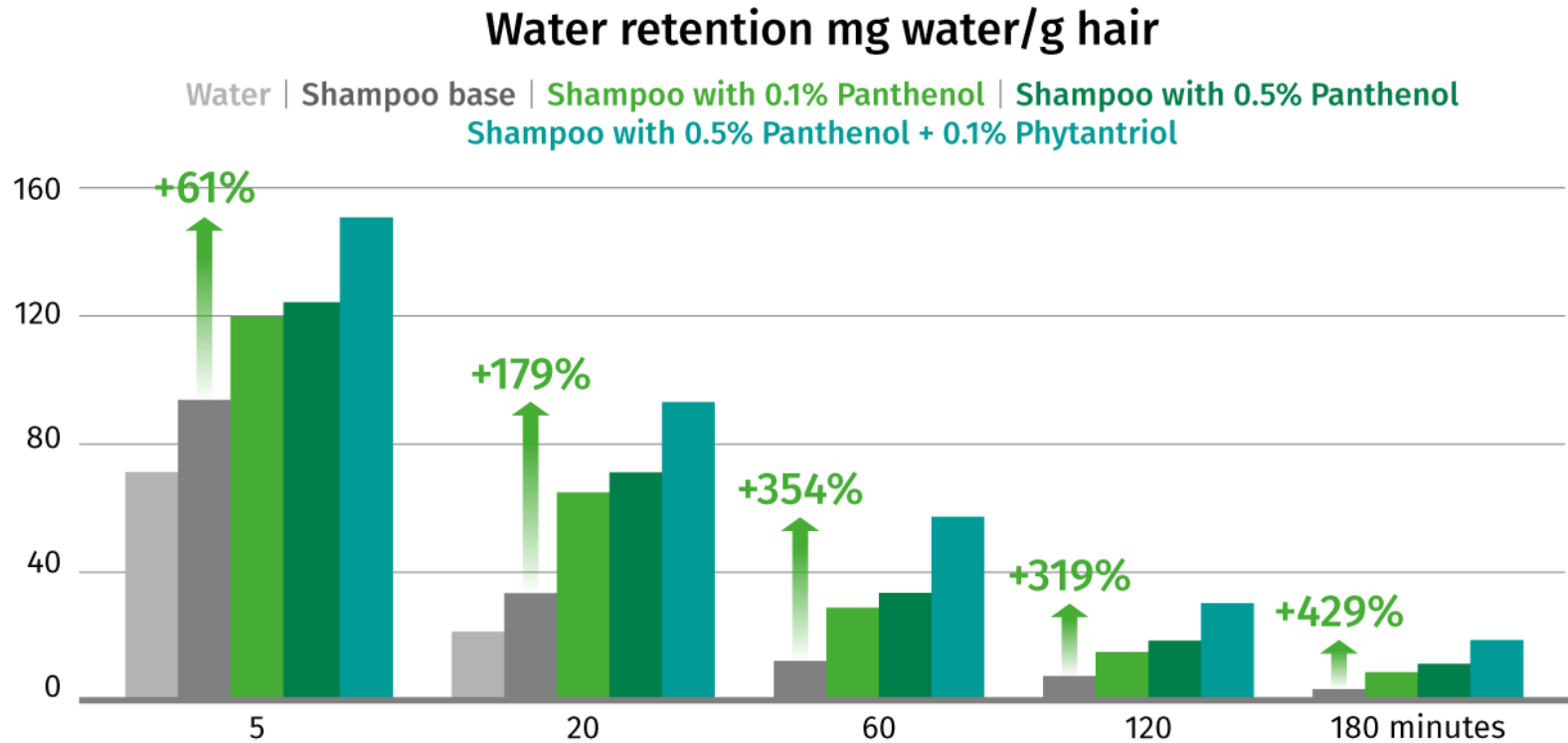
Improves, dose dependently, long lasting hydration in hair



**Improves water retention**  
Moisturization level is proportional to panthenol content in formulation

Hair soaked in a 10% shampoo solution, rinsed twice with water and blotted with tissue paper

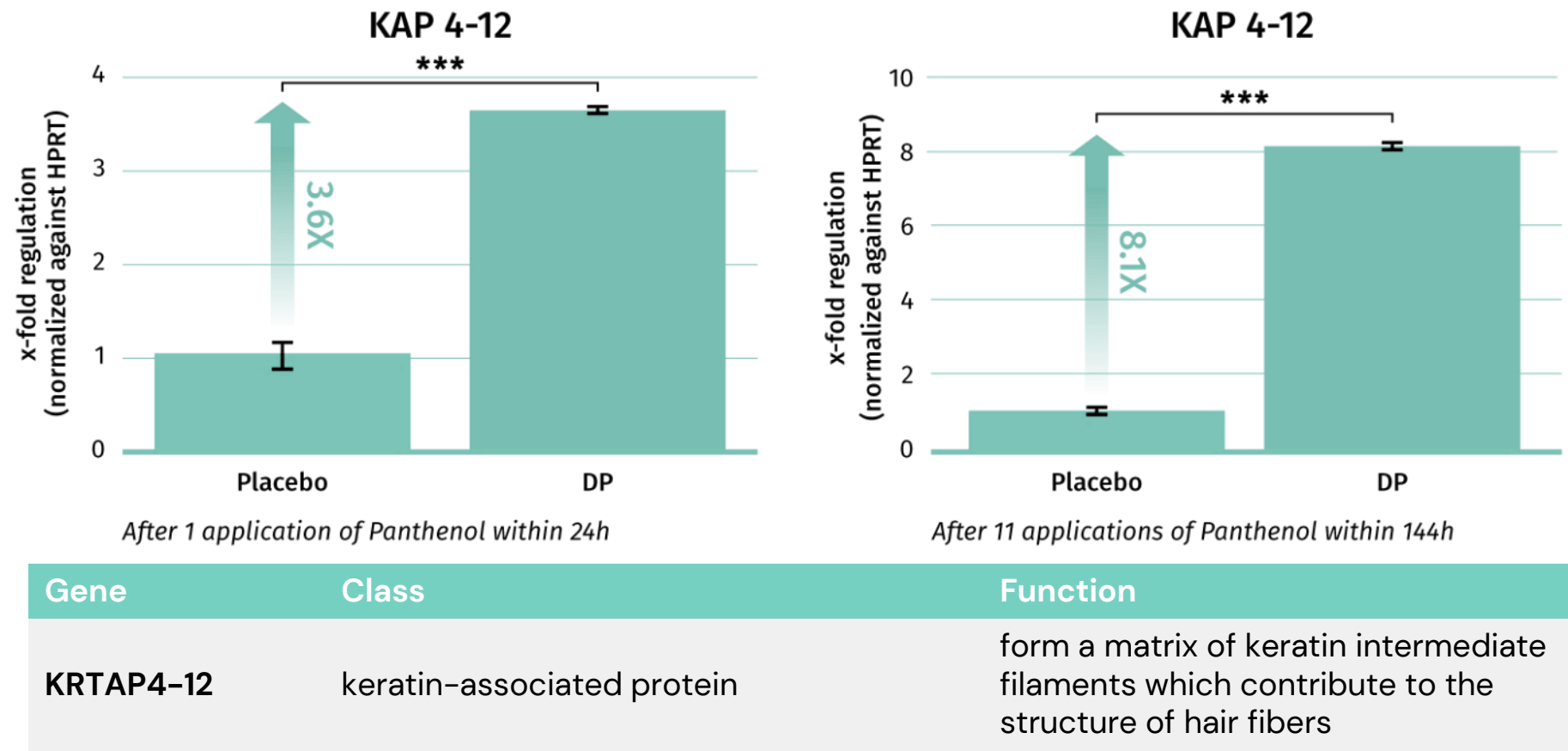
Quali-B® Pro-Vitamin B5 (Panthenol)  
Hair Moisturization in synergy with Phytantriol



Dilution of shampoo with water at 1:10.  
Hair soaked in solution, rinsed twice  
with water and blotted with tissue  
paper.  
Analysis of water loss gravimetrically.

Quali-B Pro-Vitamin B5 (Panthenol)

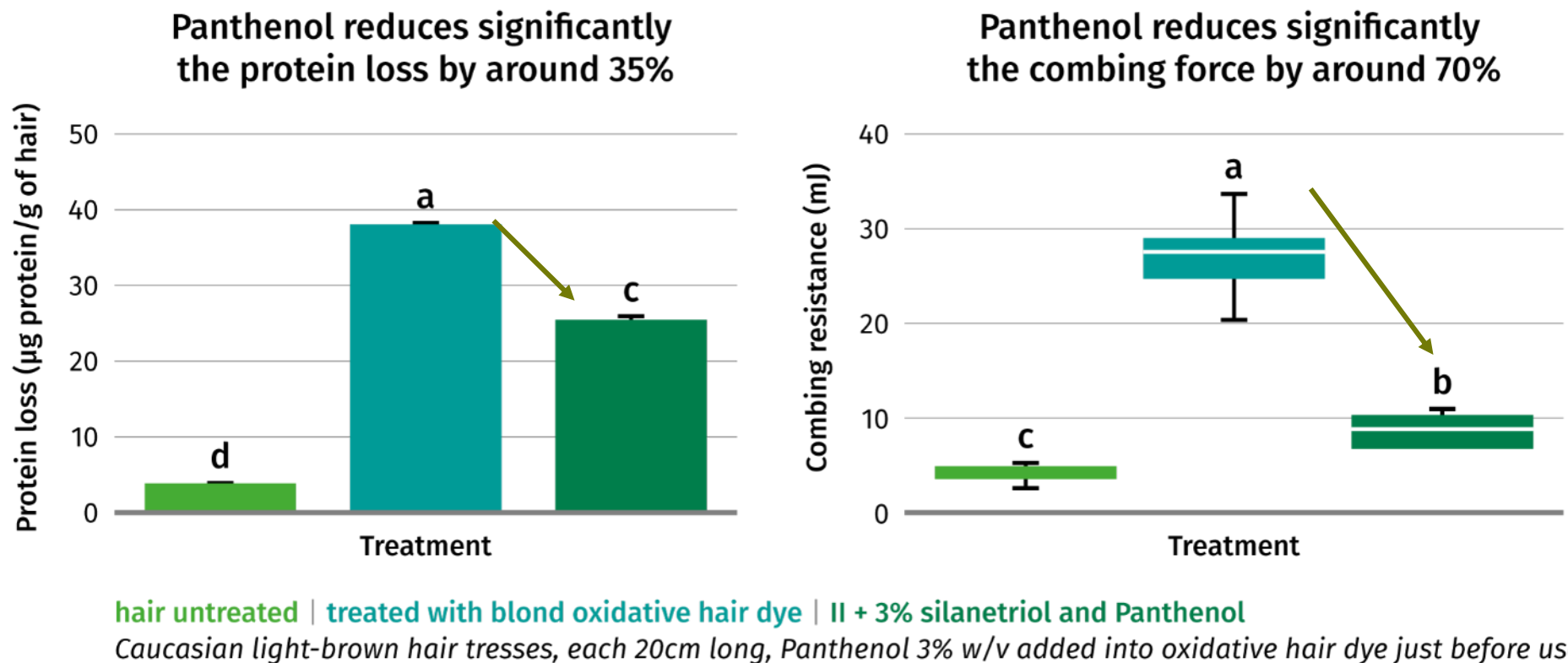
Upregulates expression of keratin 4-12 by 4-fold, strengthens hair shaft



Heise R. C. et al., Dexpanthenol Modulates Gene Expression in Skin Wound Healing in vivo. Skin Pharmacology and Physiology; 2012, 25: 241-248

Quali-B Pro-Vitamin B5 (Panthenol)

Contributes to protein loss reduction & improves combing on hair treated with oxidative hair dye



# Quali-B Vitamin B6

## ID Card



|              |                                                                                                                       |                                                 |                                                                         |
|--------------|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------|
| Key benefit: | Sebum reduction<br>Scalp Care (scaling, itch and flaking reduction)<br>Hair Thickening (helps Increase hair diameter) |                                                 |                                                                         |
| INCI name:   | Pyridoxine Hydrochloride                                                                                              |                                                 |                                                                         |
| Description: | Vitamin                                                                                                               |                                                 |                                                                         |
| Technical:   | Form: Powder<br>Use level: Up to 0.2%<br>pH of use: 4.5 to 7                                                          | Preservative: Free<br>Solubility: Water soluble | Target: Hair fiber and Scalp<br>Biodegradability: Readily biodegradable |

Registration certification\*

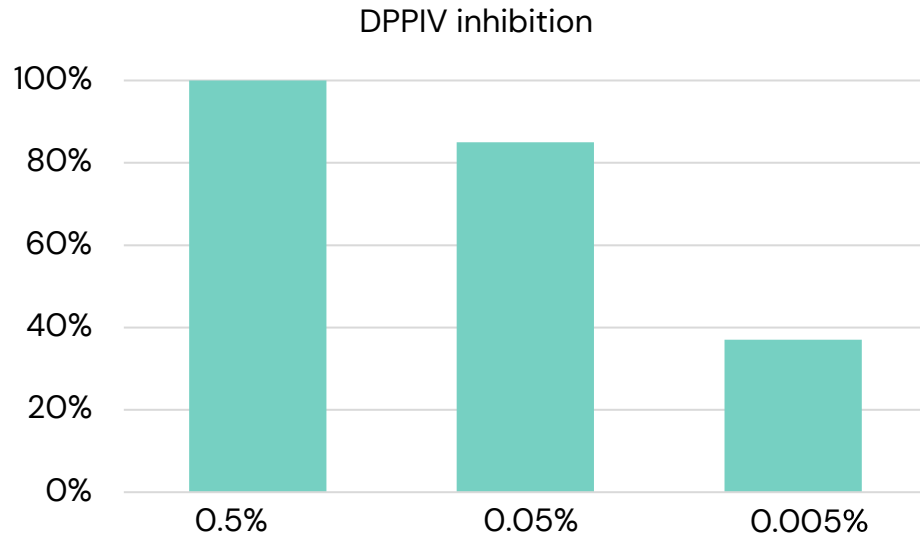


\*Product Code: 5015818  
Quality for Life™ seal that guarantees the highest standards for Quality, Reliability, Traceability, and Sustainability.

## Quali-B<sup>®</sup> Vitamin B6

### Regulates lipid synthesis in sebaceous glands– Sebum reduction

dsm-firmenich  
own study



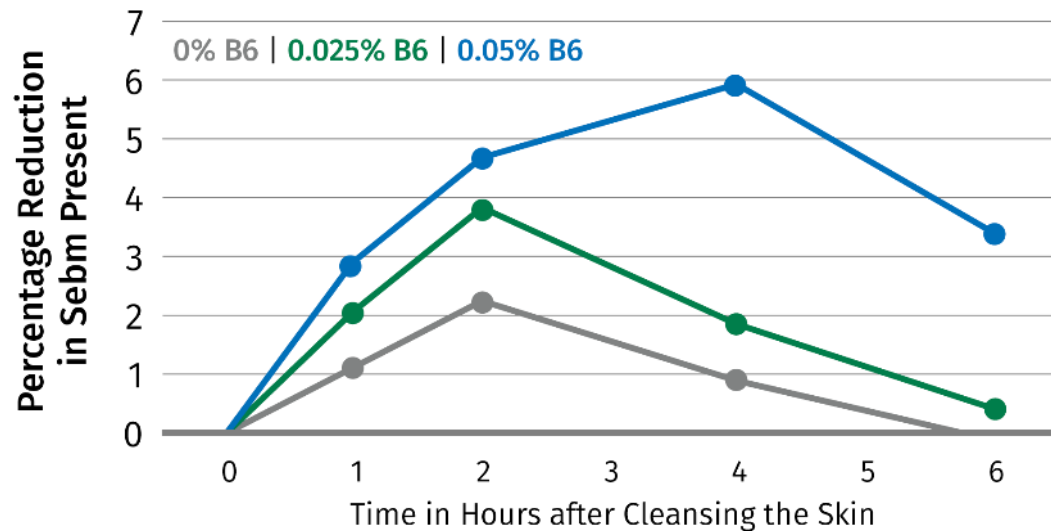
Vitamin B6 is able to inhibit the DPPIV enzyme activity in a dose **dependent** manner.

Inhibition of DPPIV decreases neutral lipids and saturated free fatty acids in a sebocyte cell line suggesting decreased sebum synthesis

# Quali-B Vitamin B6

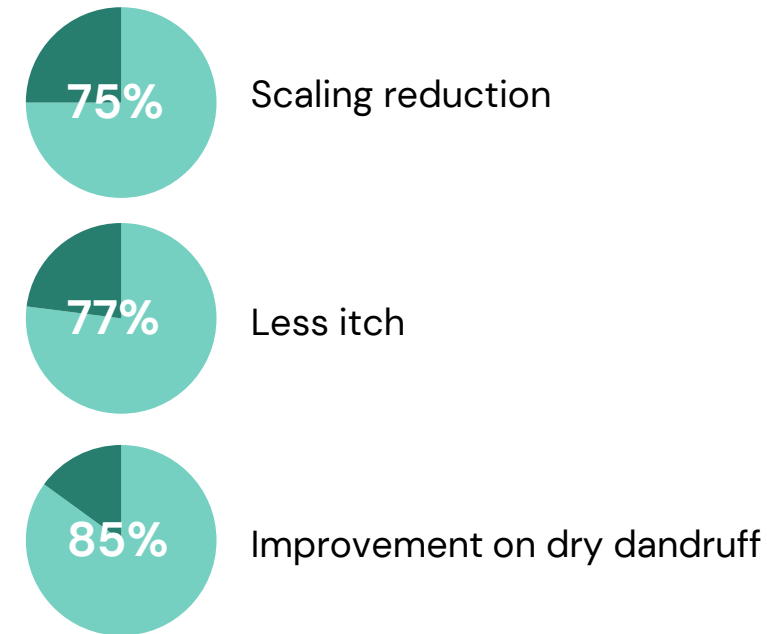
## Promotes healthy scalp

Vitamin B6 at 0.05% **reduces sebum by 6%** in one single application after 4 hours



- Facial Cream – in vivo
- Half face: treated vs untreated
- Vitamin B6 at 0.025% and 0.05%
- One single application
- After rinsed-off
- Extrapolation to scalp

Vitamin B6 at 0.02% **improves scalp conditions**



- 162 volunteers with Seborrhea capitis
- 0.02% Vitamin B6 in a lotion

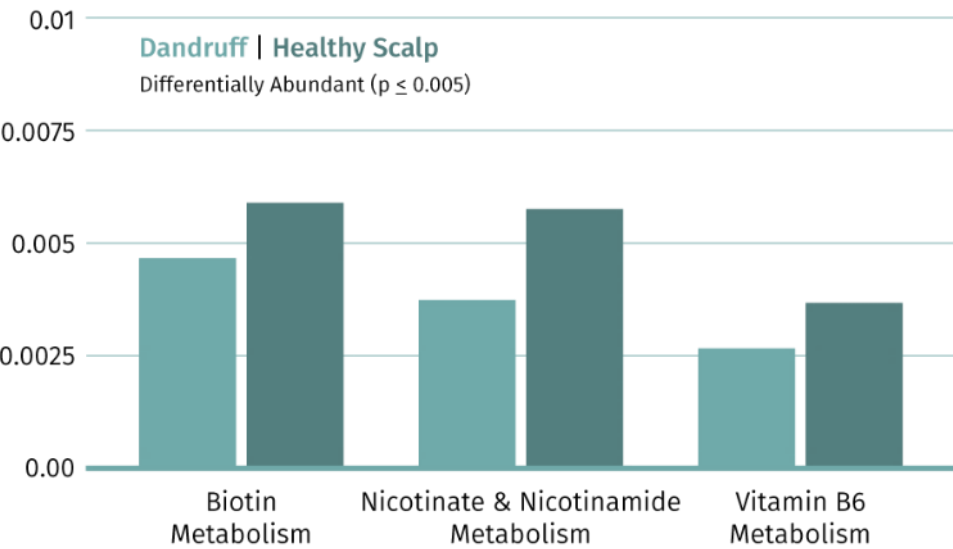
Patent: US2000/6403110. Vitamin B6 = Pyridoxin Hydrochloride.  
Ohta H. J Soc Cosmetic Chemists, 1965, 16:349–358. Vitamin B6=Pyridoxine-3,4-dipalmitate.

# Quali-B Vitamin B6

## Scalp & Microbiome



### Bacterial Metabolic Pathways enriched in a Healthy Scalp vs. a scalp with Dandruff



Reduction of biosynthesis and metabolism pathways of vitamins was observed in the bacterial microbiome of dandruff scalp (vs. healthy scalp). **Enrichment in vitamins via topical application could be a solution to compensate this deficiency.**

| Vitamin B6     |      |    |
|----------------|------|----|
| Concentration  | 0.2% | 1% |
| M. restricta   | ●    | ●  |
| M globosa      | ●    | ●  |
| C. acnes       | ↓    | ↓  |
| S. capitis     | =    | ●  |
| S. epidermidis | =    | ●  |

incubated for 24 hours  
● total antimicrobial activity  
↓ decrease microbial population  
= no variation

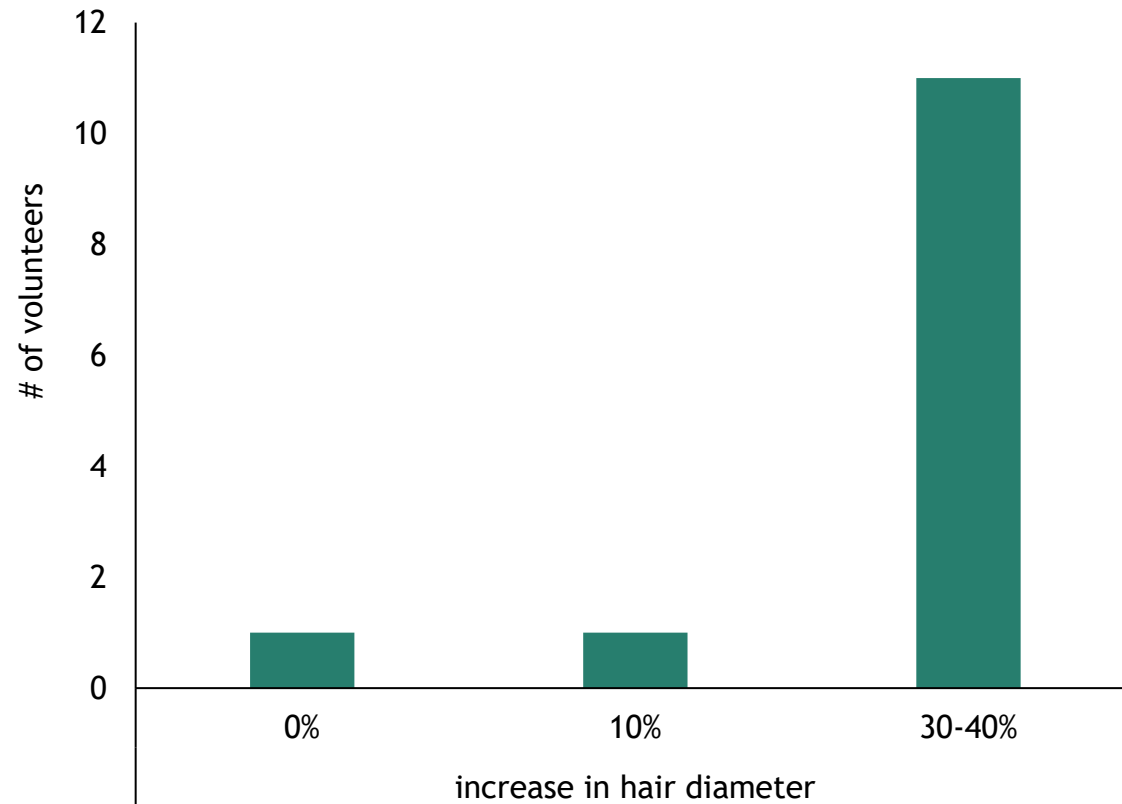
- C. acnes : total antimicrobial activity at all concentrations
- S. capitis and S. epidermidis : dose dependent antimicrobial performance
- M. restricta and M globosa: same performance in different use levels.
- M. restricta is associated with dandruff.

Vitamin B6 =pyridoxin hydrochloride

R. Saxena et al., Comparison of Healthy and Dandruff Scalp Microbiome Reveals the Role of Commensals in Scalp Health, Frontiers in Cellular and Infection Microbiology, 2018, 8-346

## Quali-B<sup>®</sup> Vitamin B6

### Increases hair diameter



Vitamin B6 increases hair diameter around 40% in 5 weeks

- Assessed by a dermatologist on the basis of magnified hair photographs
- Topically applied on scalp
- Solution with 7.5 % of Vitamin B6
- 3-5 weeks, daily use



|              |                                                                           |                                                                  |                                                              |
|--------------|---------------------------------------------------------------------------|------------------------------------------------------------------|--------------------------------------------------------------|
| Key benefit: | Scalp Care<br>Helps prevent hair loss* (based on literature for oral use) |                                                                  |                                                              |
| INCI name:   | Biotin                                                                    |                                                                  |                                                              |
| Description: | Vitamin                                                                   |                                                                  |                                                              |
| Technical:   | Form: Powder<br>Use level: Up to 0.5%<br>pH of use: 5.5 to 8              | Preservative: Free<br>Solubility: Very slightly soluble in Water | Target: Scalp<br>Biodegradability: Not readily biodegradable |

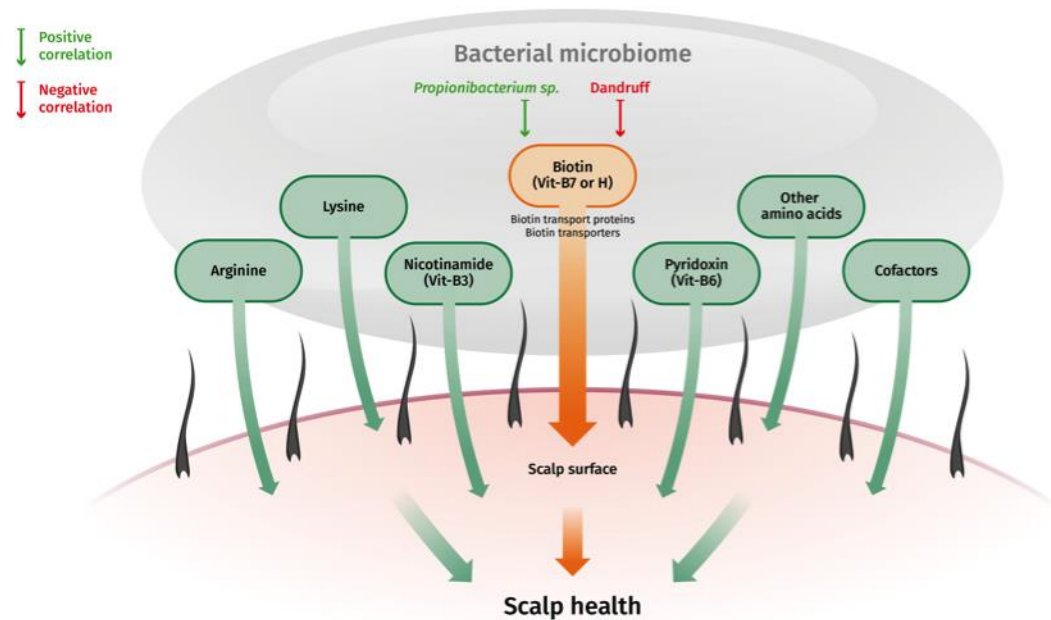
Registration  
certification



\*Drug claim in some regions  
Quality for Life™ seal that guarantees the highest standards for Quality, Reliability, Traceability, and Sustainability.

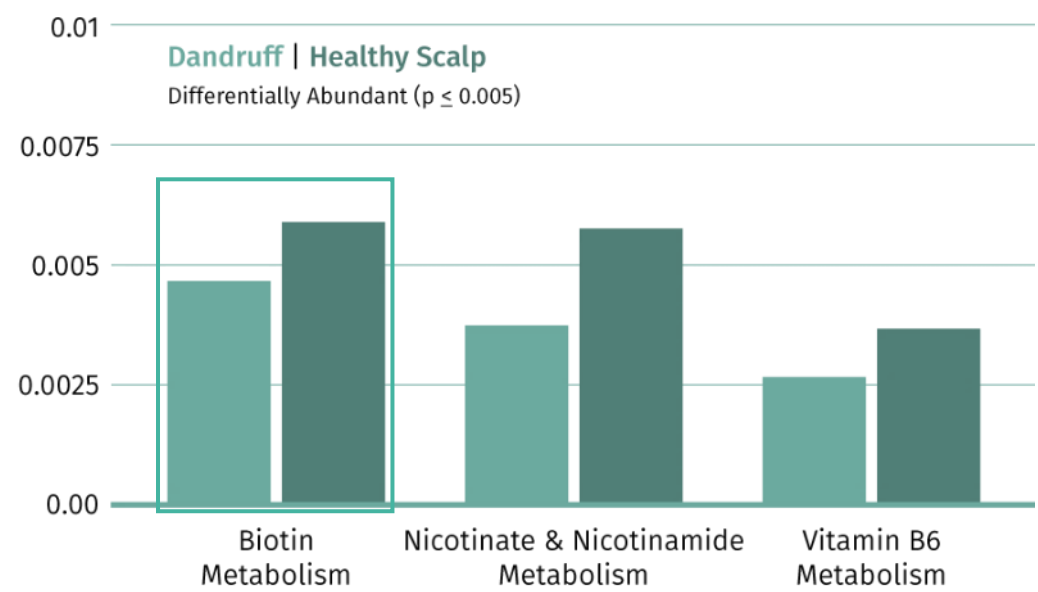
Increased in Healthy Scalp– source of nutrients for the scalp

Illustration of the mechanistic interplay observed between the scalp surface and the bacterial microbiome



The **vitamins** and amino acids synthesized by the microbiome were observed as a **useful source of nutrients for the scalp**. Biotin was observed to be majorly contributed by *Propionibacterium* spp. and **abundance of biotin** metabolism pathway significantly increase after oil-treatment and reduced with the increase in dandruff.

Bacterial Metabolic Pathways enriched in a Healthy Scalp vs. a scalp with Dandruff



Reduction of biosynthesis and metabolism pathways of vitamins was observed in the bacterial microbiome of dandruff scalp (vs. healthy scalp). **Enrichment in vitamins via topical application could be a solution to compensate this deficiency.**

R. Saxena et al., Comparison of Healthy and Dandruff Scalp Microbiome Reveals the Role of Commensals in Scalp Health, Frontiers in Cellular and Infection Microbiology, 2018, 8–346

# Quali-C Vitamin C

## ID Card



|              |                                                                                                        |                                                 |                                                                                 |
|--------------|--------------------------------------------------------------------------------------------------------|-------------------------------------------------|---------------------------------------------------------------------------------|
| Key benefit: | Scalp Care (anti-oxidant properties)<br>Blue light protection (hair fiber)<br>Helps prevent hair loss* |                                                 |                                                                                 |
| INCI name:   | Ascorbic Acid                                                                                          |                                                 |                                                                                 |
| Description: | Pure Vitamin C                                                                                         |                                                 |                                                                                 |
| Technical:   | Form: Liquid<br>Use level: Up to 15%<br>pH of use: 3.5 to 4                                            | Preservative: Free<br>Solubility: Water soluble | Target: Hair fiber and scalp<br>Biodegradability: Well Inherently biodegradable |

Registration certification



\*Drug claim in some regions  
Quality for Life™ seal that guarantees the highest standards for Quality, Reliability, Traceability, and Sustainability.

# STAY-C® 50

## ID Card



|              |                                                                                                                                        |                                                 |                                                                                 |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|---------------------------------------------------------------------------------|
| Key benefit: | Scalp Care (anti-oxidant properties)<br>Blue light protection (hair fiber)<br>Helps prevent hair loss*                                 |                                                 |                                                                                 |
| INCI name:   | Sodium Ascorbyl Phosphate                                                                                                              |                                                 |                                                                                 |
| Description: | Monophosphate ester of ascorbic acid (vitamin C derivative with superior stability in formulations compared to straight ascorbic acid) |                                                 |                                                                                 |
| Technical:   | Form: Liquid<br>Use level: Up to 2%<br>pH of use: ≥ 6                                                                                  | Preservative: Free<br>Solubility: Water soluble | Target: Hair fiber and scalp<br>Biodegradability: Well inherently biodegradable |

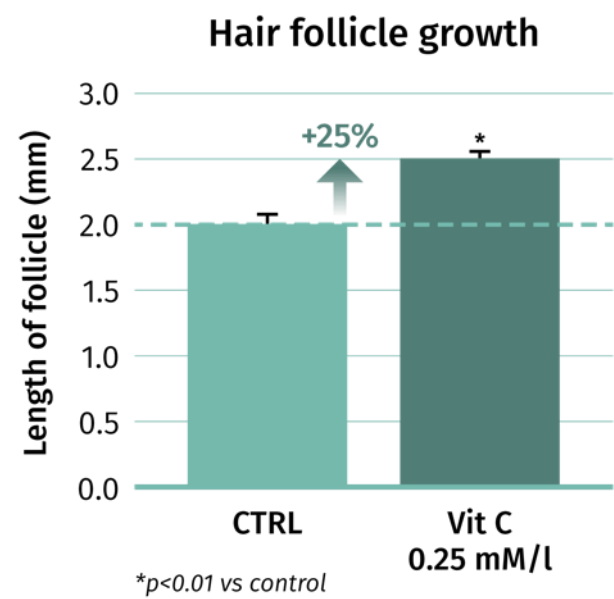
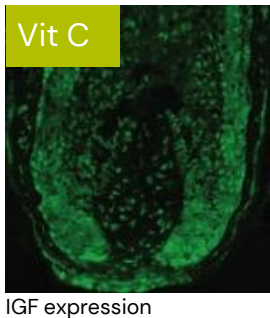
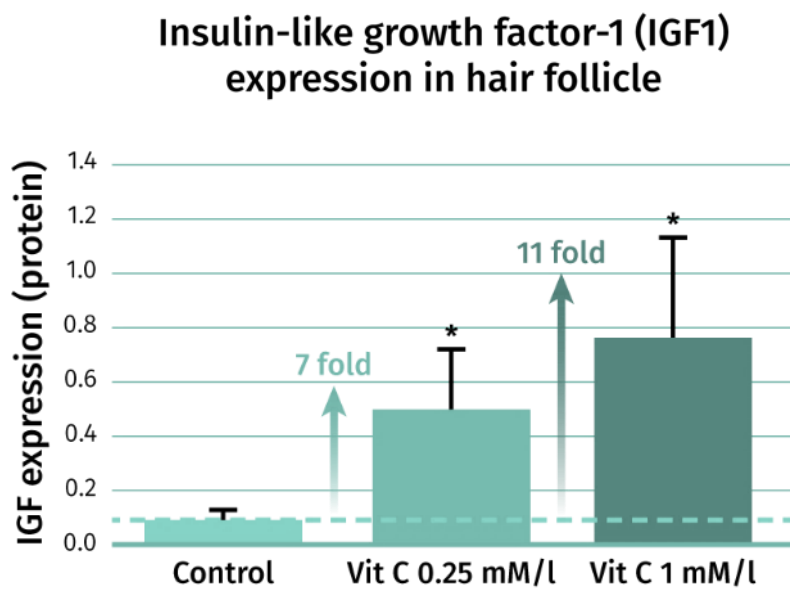
Registration certification\*\*



\*Drug claim in some regions  
\*\*Production site: France (product code 5000858)

# Vitamin C

Induces hair follicle growth up to 25%



Vitamin C stimulated the growth of cultured human hair follicle by upregulating IGF-1 up to 11 fold.

- Human hair follicles obtained from scalp biopsies
- Vitamin C #,0.25 and 1 mM/l, 9 days

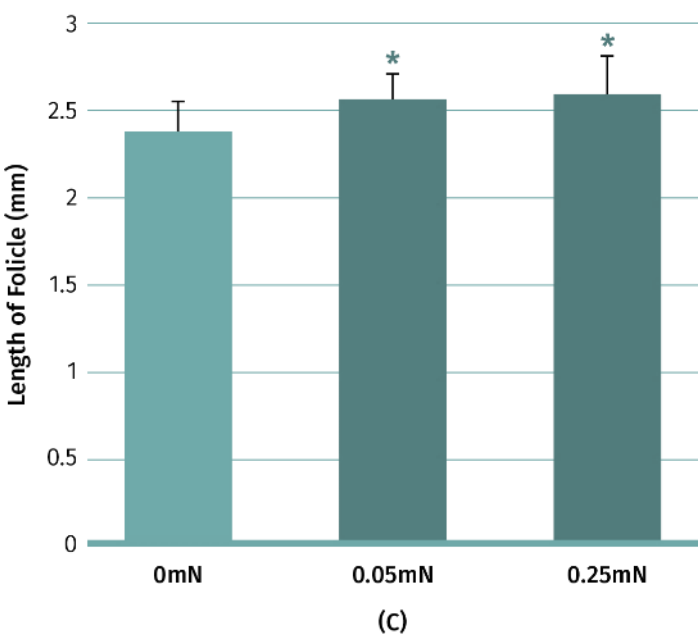
Kwack MH et al. Br J Dermatol. 2009 Jun;160(6):1157-62.  
\*L-Ascorbic acid 2-phosphate

# Vitamin C

## Induces hair follicle growth

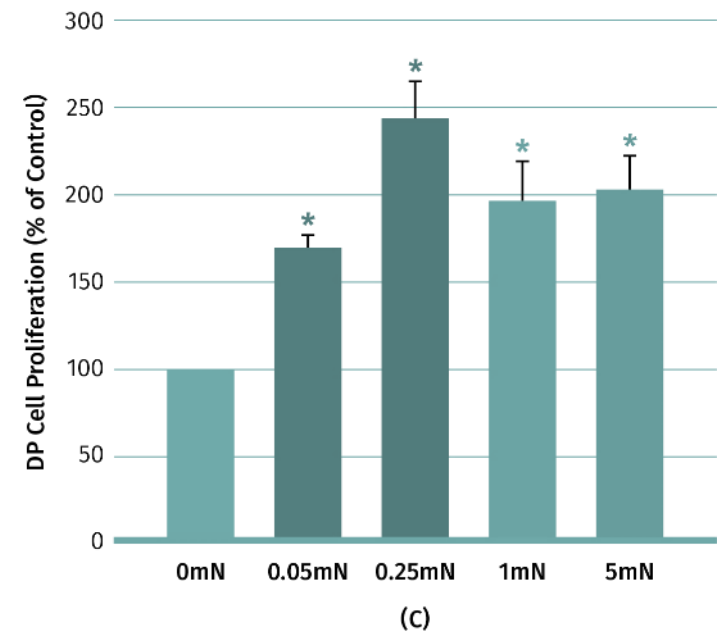
Human hair follicles were treated with Vitamin C for 9 days. **Hair length increased** significantly with **Vitamin C**.<sup>1</sup>

\*p<0.05 vs 0mM

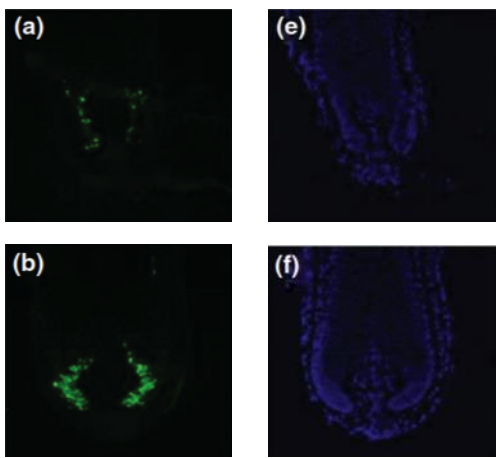


Human dermal papilla (DP) cells were incubated with Vitamin C for 5 days. **Proliferation increased** significantly with **Asc 2-P**.

\*p<0.05 vs 0mM



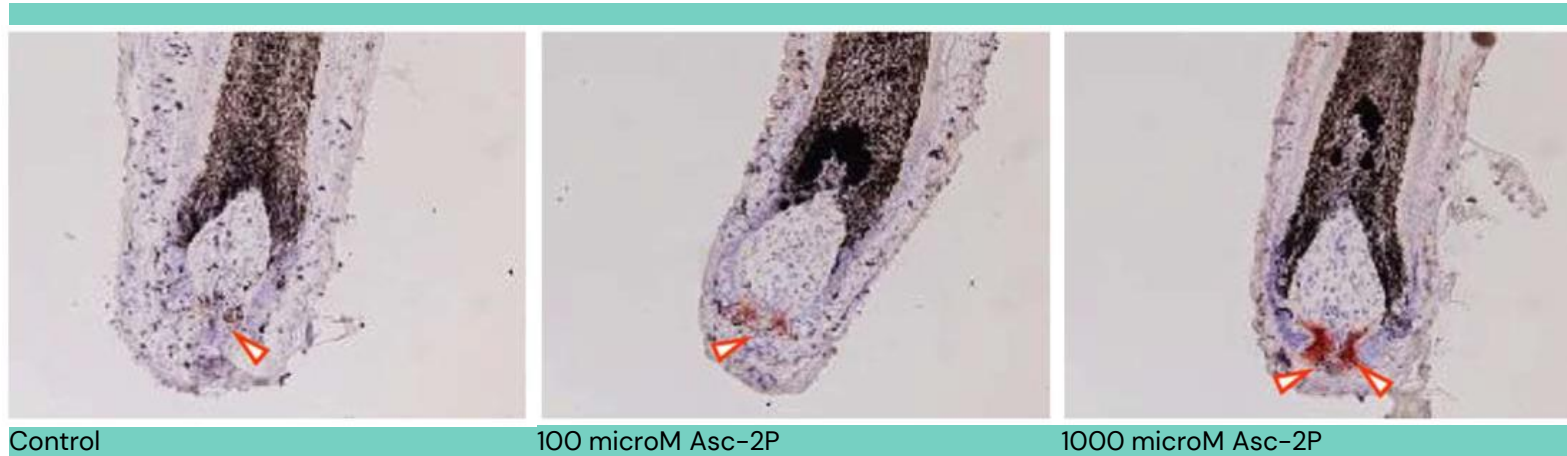
Asc 2-P **induces proliferation** in cultured human hair follicles as shown by **Ki67** staining (green) (b) which is not seen in vehicle treated follicles (a). (e) and (f) are the respective follicles with DAPI staining (blue) to show all the cells.<sup>2</sup>



<sup>1</sup> Sung. et al. Journal of Dermatological Science (2006) 41, 150—152  
<sup>2</sup> Kwack et al. British Journal of Dermatology 2009 160, pp1157–1162

# Vitamin C

## Induces hair follicle growth



Cultured hair follicles were treated with Asc 2-P for 3 days.

Versican expression was up regulated in the dermal papilla (red staining indicated by red arrow heads) by immunohistochemistry.

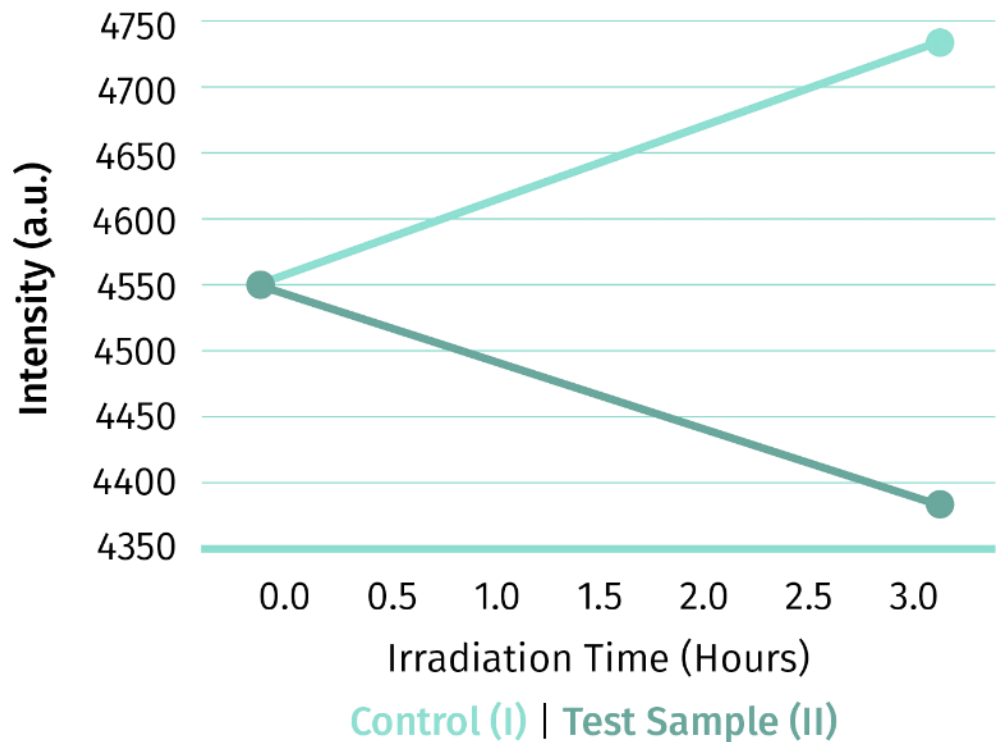
Versican is an inducer of hair growth in the dermal papilla.

\*Asc- 2P: L-Ascorbic acid 2-phosphate  
Kim et al. Journal of Dermatological Science (2006) 43, 60–62

# Vitamin C

## Protects from free radical formation in blue light irradiated black hair

Vitamin C (Ascorbic Acid) clearly decreases free radicals formation induced by blue light irradiation



Control increases free radicals by 4%, while Vitamin C treated hair decreases by 4%.

- Black hair was incubated with a solution containing 100 nM Ascorbic Acid (Test Sample II) and Control Solution (Control I)
- It was then irradiated with blue light (450 nm) and the ESR spectra was measured

Chikvaidze et al. International Journal of Cosmetic Science, 2011, 33, 322–327

LOWEST CO2

COMPARED  
TO MAIN  
ALTERNATIVE  
SOURCES<sup>3</sup>:



59%  
lower greenhouse  
gas emissions<sup>2</sup>

BETTER AIR QUALITY

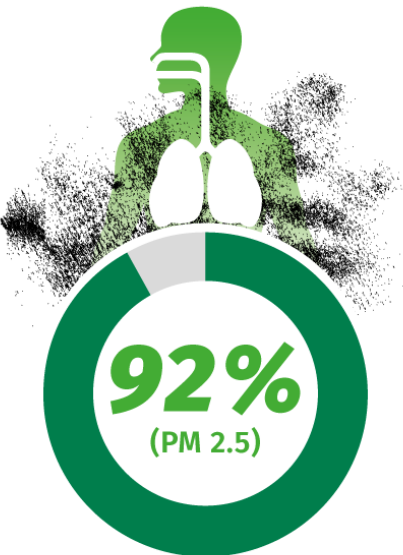
Buying  
1,000 TONNES  
of Quali-C

WOULD SAVE

14,000 TONNES<sup>4</sup>  
CO<sub>2</sub> EQ.



Equivalent to entire carbon  
sequestered by  
210,000 TREE SEEDLINGS  
grown for 10 years<sup>5</sup>



Reduction in  
dust and particle  
matter<sup>2</sup>



Reduction in  
photochemical ozone  
formation<sup>2</sup>  
(summer smog)

1. Amount of greenhouse gases in CO<sub>2</sub>-equivalents released into the atmosphere as a result of an activity. 2. This statement is based on a DSM internal Life Cycle Assessment that was independently verified by Pré Consultants in December 2018, and updated in May 2019.  
3. This statement is based on DSM internal business intelligence using latest market insights, permits and other publications. 4. Versus main alternative sources.  
5. As per Greenhouse Gas Equivalencies Calculator developed by United States Environmental Protection Agency: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>.



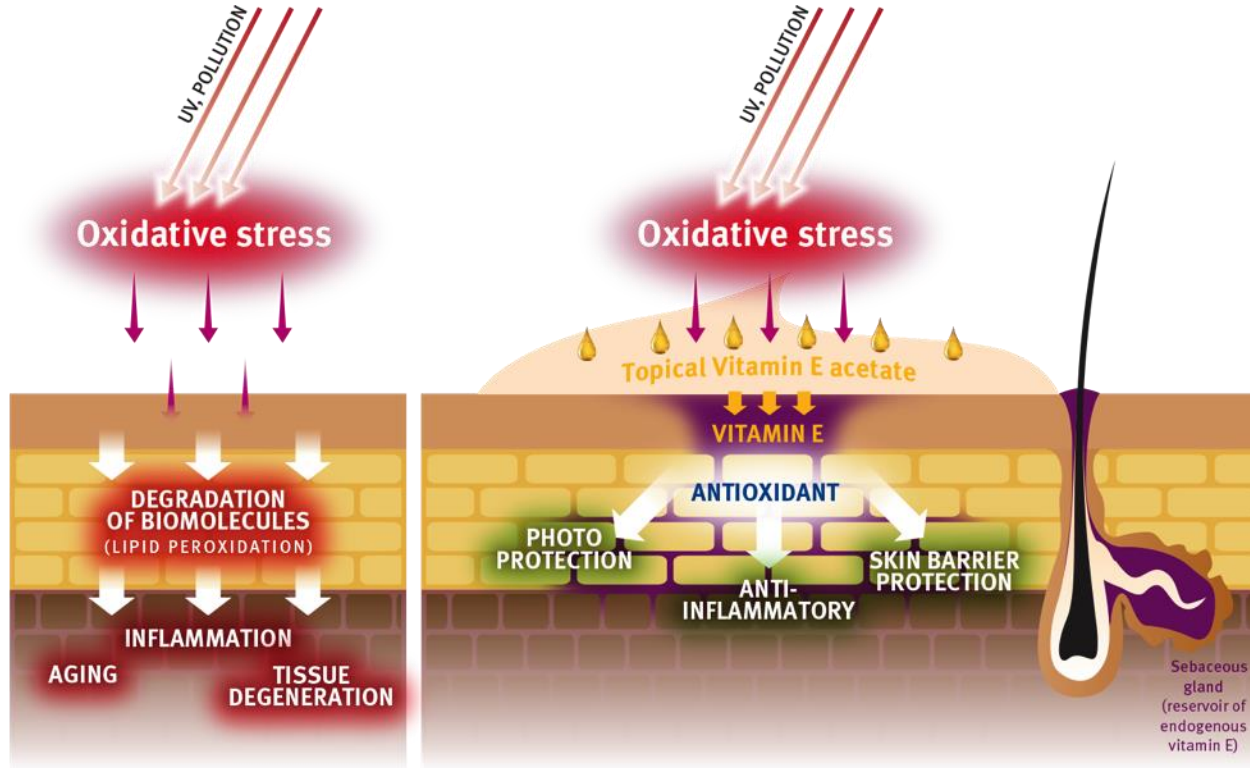
|              |                                                                                                                                                                             |                                               |                                                                             |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|-----------------------------------------------------------------------------|
| Key benefit: | Hair Protection (protein loss / discoloration)<br>Scalp Care                                                                                                                |                                               |                                                                             |
| INCI name:   | Tocopherol<br>Tocopheryl Acetate                                                                                                                                            |                                               |                                                                             |
| Description: | <b>Synthetic:</b> (1) dl- $\alpha$ -Tocopherol and (2) dl- $\alpha$ -Tocopheryl Acetate<br><b>Natural:</b> (3) Mixed Tocopherols 95 and (4) d- $\alpha$ -Tocopheryl Acetate |                                               |                                                                             |
| Technical:   | Form: Liquid<br>Use level: Up to 1%<br>pH of use: 3.5 to 8                                                                                                                  | Preservative: Free<br>Solubility: Oil soluble | Target: Hair fiber and scalp<br>Biodegradability: Not readily biodegradable |

Registration certification\*



Quality for Life™ seal that guarantees the highest standards for Quality, Reliability, Traceability, and Sustainability.  
\* dl- $\alpha$ -Tocopheryl Acetate

## Protects scalp against oxidative stress



### Anti-aging

- Anti-oxidant properties
- Improves skin Barrier function
- Prevents peroxidation of lipids and oxidation of proteins

### Anti-greying

- ROS neutralization (literature based)

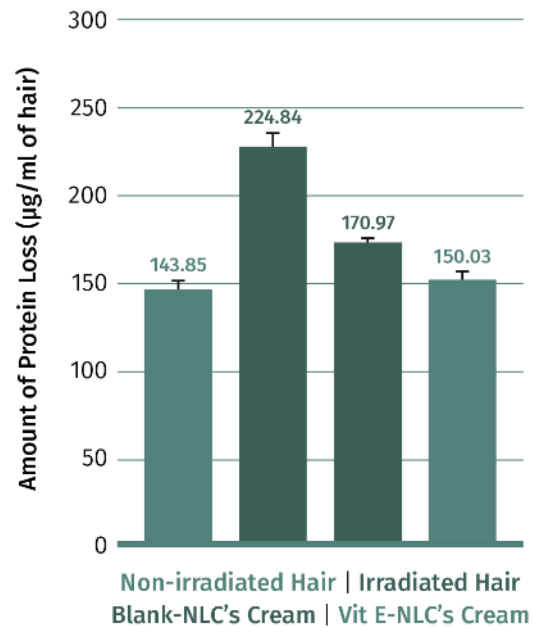
# Quali-E Vitamin E

## Protects hair from protein loss and discoloration caused by UV and heat

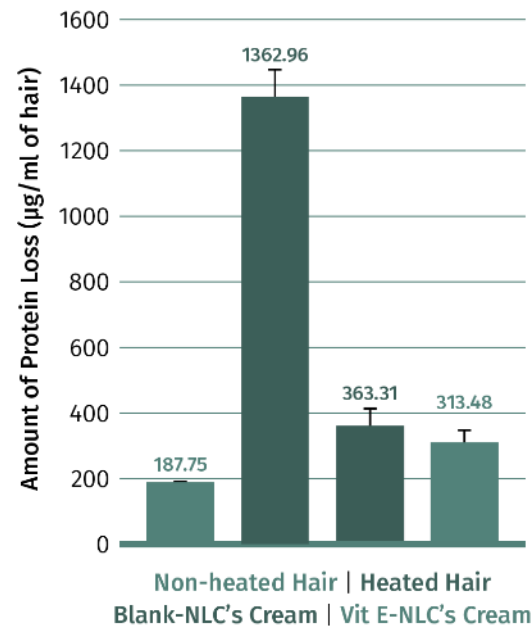
UV and heat-induced protein loss of hair tresses was reduced with Vitamin E-loaded NLCs.

\*p<0.05 vs Blank NLC cream

### Irradiation Test



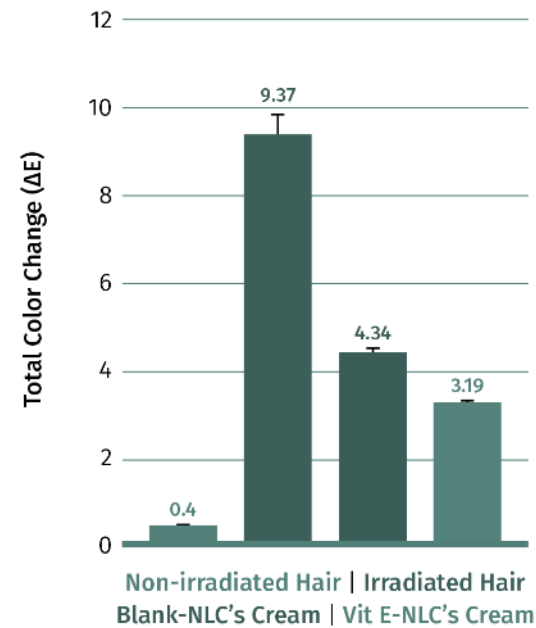
### Heat Test



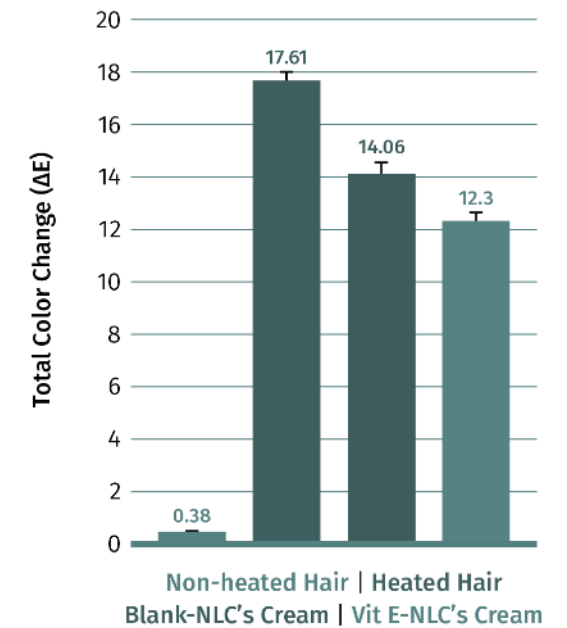
UV and heat-induced discoloration of hair tresses was reduced with Vitamin E-loaded NLCs.

\*p<0.05 vs Blank NLC cream

### Irradiation Test



### Heat Test



Prasertpol et al. J Photochem Photobiol B (2010) 21(2), 91–99 – NLCs =nanostructured lipid carriers  
Vitamin E Acetate at 0.2% – Irradiation: UVB and UVA

# TILAMAR® Quat 640

## ID Card



|                         |                                                                                                                                            |                                                                                                                         |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Key benefit:            | Ultimate conditioning and weightless feel<br>Confers excellent wet and dry combability<br>Imparts excellent lubricity and feel on dry tips | Conditioning / Ease of Combing                                                                                          |
| INCI name:<br>(Polymer) | Polyquaternium-6                                                                                                                           |                                                                                                                         |
| Description:            | Polymer                                                                                                                                    |                                                                                                                         |
| Technical:              | Form: Liquid<br>Use level: Up to 3%<br>pH of use: 3 to 12                                                                                  | Preservative: Free<br>Solubility: Water soluble<br>Target: Hair fiber<br>Biodegradability: Not inherently biodegradable |

Registration certification



For more information, access the master presentation

# TILAMAR® Quat 2240

## ID Card



|                            |                                                                                                                                                                                   |                                                            |                                                                   |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|-------------------------------------------------------------------|
| Key benefit:               | Deep conditioning and weightless feel for clear shampoos<br>Conditioning / Ease of Combing<br>Delivers superior detangling properties                                             |                                                            | Gives clear and transparent formulations                          |
| INCI name:<br>(Polymer)    | Polyquaternium-22                                                                                                                                                                 |                                                            |                                                                   |
| Description:               | Polymer                                                                                                                                                                           |                                                            |                                                                   |
| Technical:                 | Form: Liquid<br>Use level: Up to 3%<br>pH of use: 3 to 12<br>Clear shampoo: pH: 4.9 to 5.4                                                                                        | Preservative: Sodium Benzoate<br>Solubility: Water soluble | Target: Hair fiber<br>Biodegradability: Not readily biodegradable |
| Registration certification | <div></div> |                                                            |                                                                   |

For more information, access the master presentation

# PARSOL® SLX

## ID Card for hair care



|                                   |                            |                                                                                      |                                         |
|-----------------------------------|----------------------------|--------------------------------------------------------------------------------------|-----------------------------------------|
| <b>Key benefits:</b>              |                            | UV Protection<br>Color Protection                                                    | Shine<br>Conditioning / Ease of Combing |
| <b>INCI name:</b>                 | Polysilicone-15            |                                                                                      | <b>Product code:</b>                    |
|                                   |                            |                                                                                      | Old code: 50 1043 8                     |
|                                   |                            |                                                                                      | New code: 50 1825 6                     |
| <b>Description:</b>               |                            | Polymeric UVB filter consisting of chromophores attached to a silicone backbone      |                                         |
| <b>Technical:</b>                 | <b>Form:</b> Liquid        |                                                                                      | <b>Preservative:</b> Free               |
|                                   | <b>Use level:</b> Up to 5% |                                                                                      | <b>Solubility:</b> Oil soluble          |
|                                   | <b>pH of use:</b> 3 to 9   |                                                                                      | <b>Target:</b> Hair fiber               |
| <b>Registration certification</b> |                            | <b>Biodegradability:</b> Not readily biodegradable                                   |                                         |
|                                   |                            |   |                                         |
|                                   |                            |   |                                         |
|                                   |                            |  |                                         |

For more information, access the master presentation

# PARSOL® MCX

## ID Card



|              |                                                           |                                               |                                                               |
|--------------|-----------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------------|
| Key benefit: | UV Protection<br>Color Protection                         |                                               |                                                               |
| INCI name:   | Ethylhexyl Methoxycinnamate, Bht                          |                                               |                                                               |
| Description: | Strong UVB absorber                                       |                                               |                                                               |
| Technical:   | Form: Liquid<br>Use level: Up to 10%<br>pH of use: 3 to 9 | Preservative: Free<br>Solubility: Oil soluble | Target: Hair fiber<br>Biodegradability: Readily biodegradable |

Registration certification





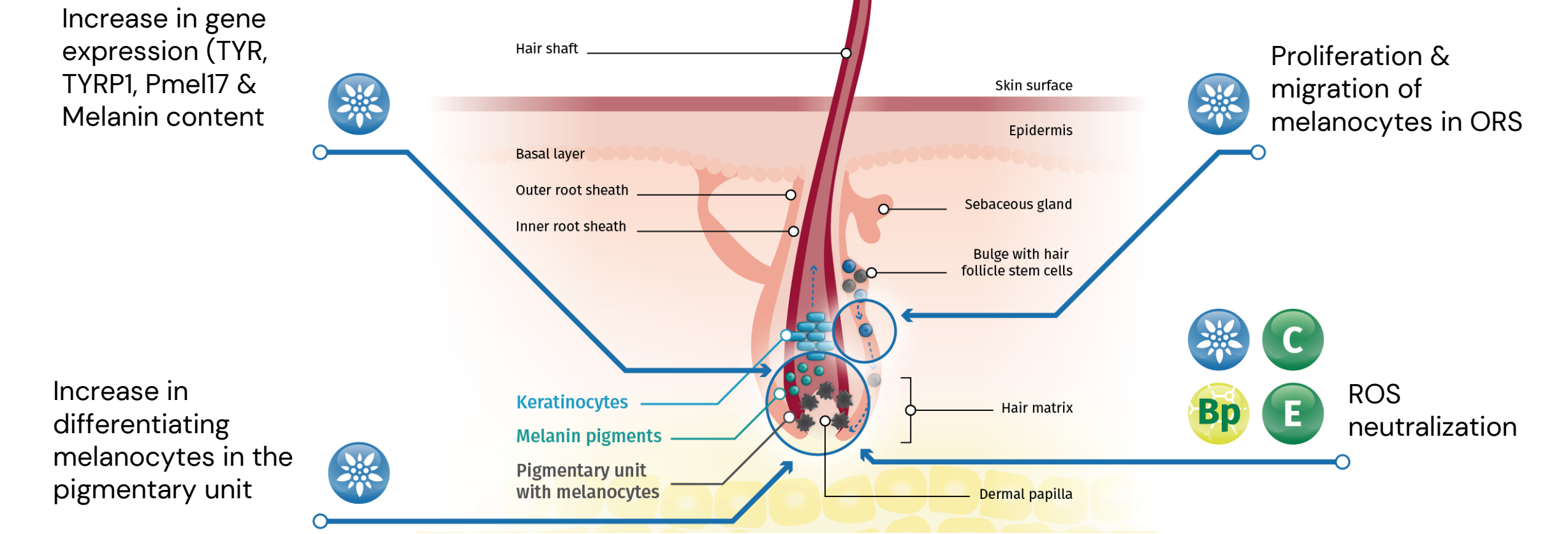
# Hair Care from Scalp to Tip

dsm-firmenich  
targeted solutions

dsm-firmenich Solutions

Hair pigmentation\*

- ALPAFLOR® EDELWEISS CB
- BeauPlex® VH
- Vitamin C
- Vitamin E



\*Helps reduce the appearance of greying hair

# dsm-firmenich Solutions for Hair Loss\*

## Multitargeted solutions to help prevent hair loss



### ALPAFLOR® EDELWEISS CB:

Increases hair density

- Promotes keratinocytes Ki-67+ proliferation
- Prolongs anagen phase
- Increases Versican expression
- Increases Alkaline phosphatase activity
- Increases FGF7 expression in Dermal Papilla
- Increases IGF1 expression in outer root sheath
- Increases Anagen to Telogen (A/T) ratio



### Vitamin C:

Increases hair length

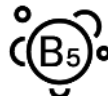
- Promotes keratinocytes Ki-67+ proliferation
- Increases Versican activity
- Increases Alkaline phosphatase activity
- Up-regulates IGF1
- Down-regulates TGFβ2



### Niacinamide PC:

Increases hair thickness

- Promotes hair diameter increase



### Panthenol:

Increases hair strength

- Upregulates KAP 4-12



### Biotin:

Promotes hair growth

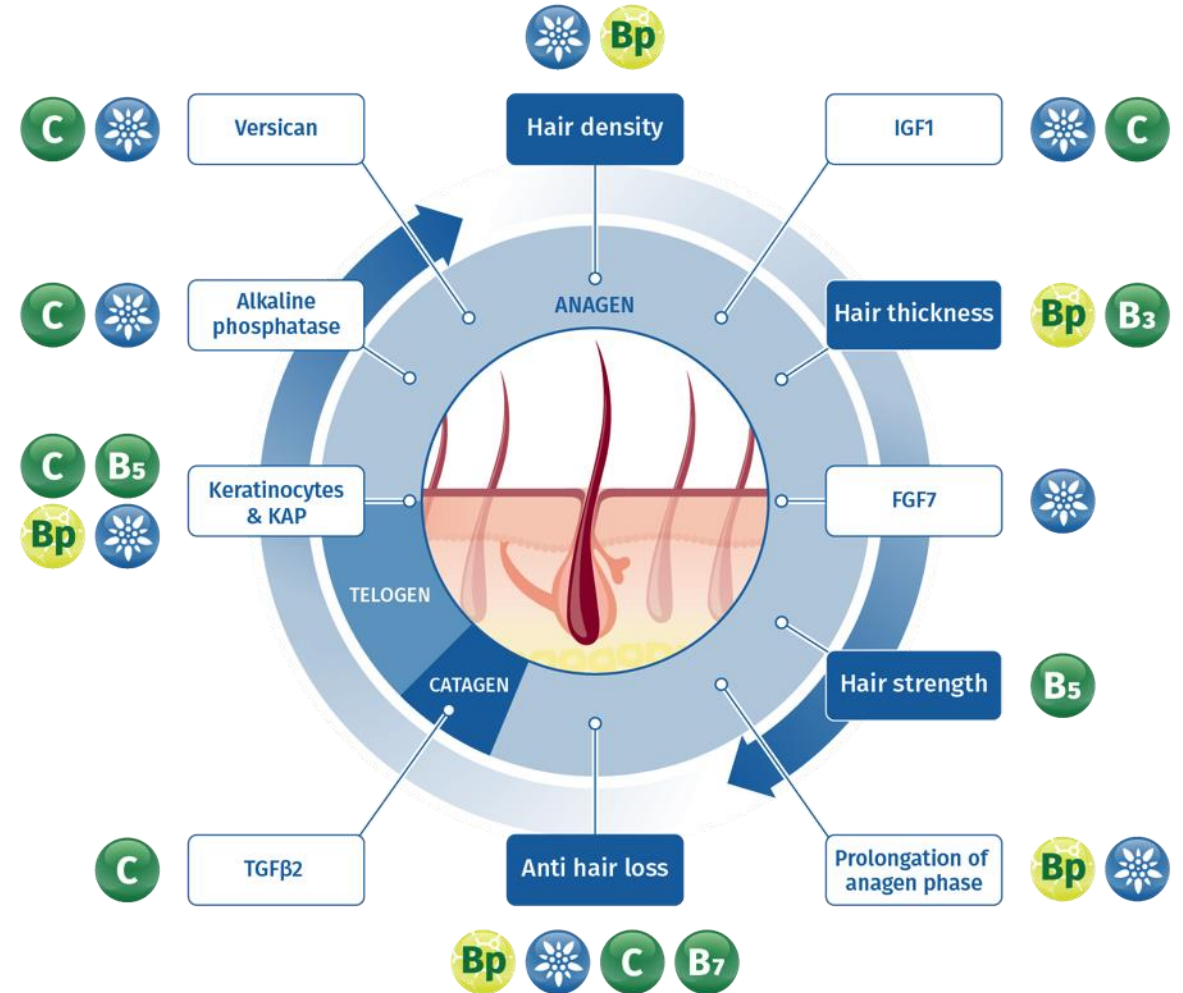
- Promotion in case of Biotin deficiency (oral)



### BeauPlex® VH:

Increases hair thickness

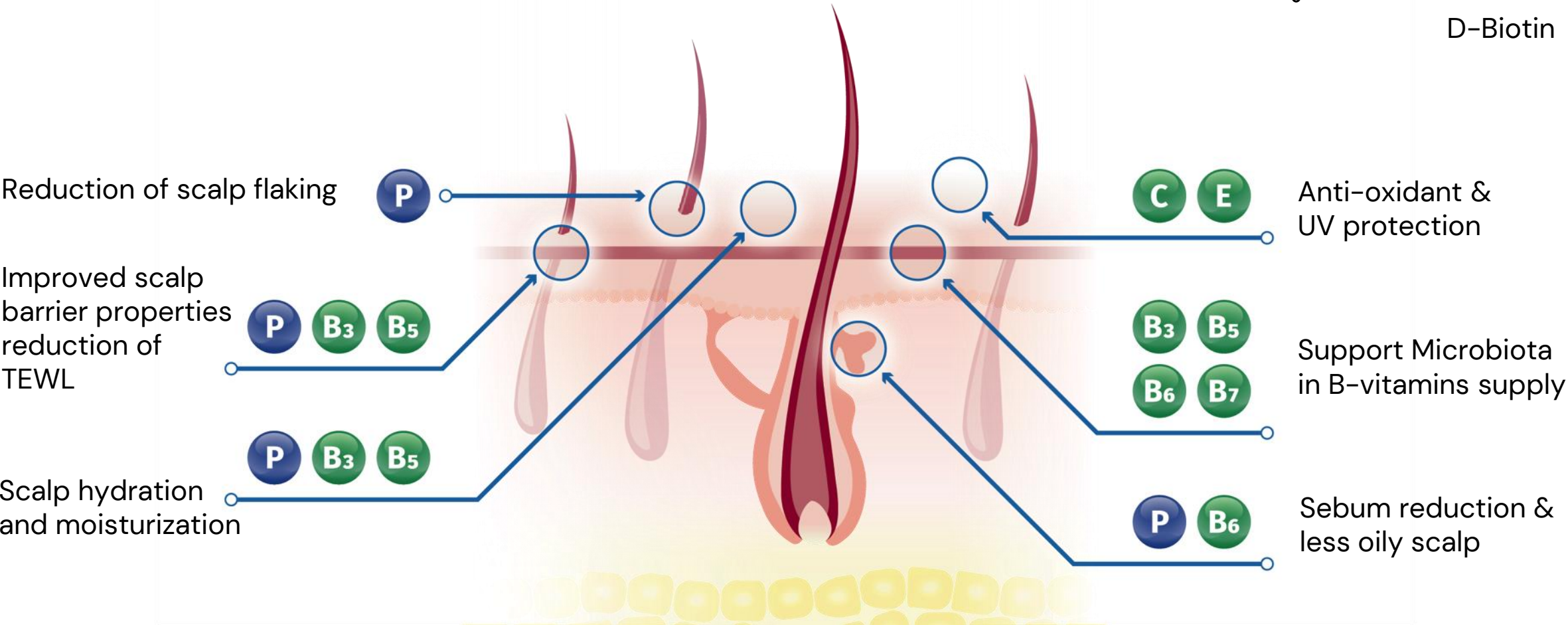
- Promotes keratinocytes Ki-67+ proliferation
- Prolongs anagen phase
- increases Anagen to Telogen (A/T) ratio



\*Helps prevent hair loss / Drug claim in some regions

# dsm-firmenich Solutions for Scalp Care

- PENTAVITIN® 
- Vitamin C 
- Vitamin E 
- Vitamin B3 
- Pro-Vitamin B5 
- Vitamin B6 
- D-Biotin 



# Disclaimer

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**We bring progress to life**



# Back-up

# ALPAFLOR® EDELWEISS CB

## Study Design

- Double-blind, randomized, placebo controlled *in-vivo* study (Europe)
- Data collection from Sept 2020 to March 2021
- Two groups of 30 volunteers per group, 18 – 65 years old (mean 45 y.) – 5 months study
- Standard shampoo formulation (SLES based) used by all volunteers of both groups

### Test product: Leave-on Formulation Placebo vs Leave-on + 3w/w% ALPAFLOR® EDELWEISS CB

- Apply the product daily (4 mL) in the evening on the scalp (gentle massage, no rinse)
- Parameters at Day 0 & Day 150:
- General photograph of the hair
- Cosmetic Trichogram
- Trichoscan®: hair density & hair thickness



# ALPAFLOR® EDELWEISS CB

## In vivo studies / Hair Pigmentation\*

- Double-blind, randomized, placebo controlled *in-vivo* study (Europe)
- Data collection from July to Dec. 2020
- Two groups of 30 volunteers per group, 18 – 45 years old (mean 39 y.) – 4 months study
- Standard shampoo formulation (SLES based) used by all volunteers of both groups

**Test product: Leave-on Formulation Placebo vs Leave-on + 3w/w% ALPAFLOR® EDELWEISS CB**

| Ingredient                 | INCI Name                                                             | % w/w  |
|----------------------------|-----------------------------------------------------------------------|--------|
| Water Dem                  | AQUA                                                                  | To 100 |
| Cosphaderm Pentiol natural | PENTYLENE GLYCOL                                                      | 5.00   |
| Cosmedia Ultragel 300      | POLYQUATERNIUM-37                                                     | 0.30   |
| ALPAFLOR® EDELWEISS CB     | LEONTOPODIUM ALPINUM FLOWER/LEAF EXTRACT, GLYCERIN, AQUA, CITRIC ACID | 3.00   |
| Ethanol abs                | ALCOHOL                                                               | 30.00  |

- Apply the product daily (4 mL) in the evening on the scalp (gentle massage, no rinse)
- Parameters at Day 0 & Day 120:
  - General photography (grey scale)
  - Hair images with micro-camera (Trichoscan®: ratio white/non-white hairs)

Shampoo: Aqua (Water), Sodium Laureth Sulfate, Laureth-2, PEG-7 Glyceryl Cocoate, Cocamidopropyl Betaine, Decyl Glucoside, Glycerin, Disodium Cocoamphodiacetate, Phenoxyethanol, Sodium Chloride, Sodium Benzoate, Disodium EDTA, Ethylhexylglycerin, Parfum (Fragrance), Citric Acid, Avena Sativa (Oat) Kernel Extract, Potassium Sorbate

\*Helps reduce the appearance of greying hair



# PENTAVITIN®

## In vivo studies

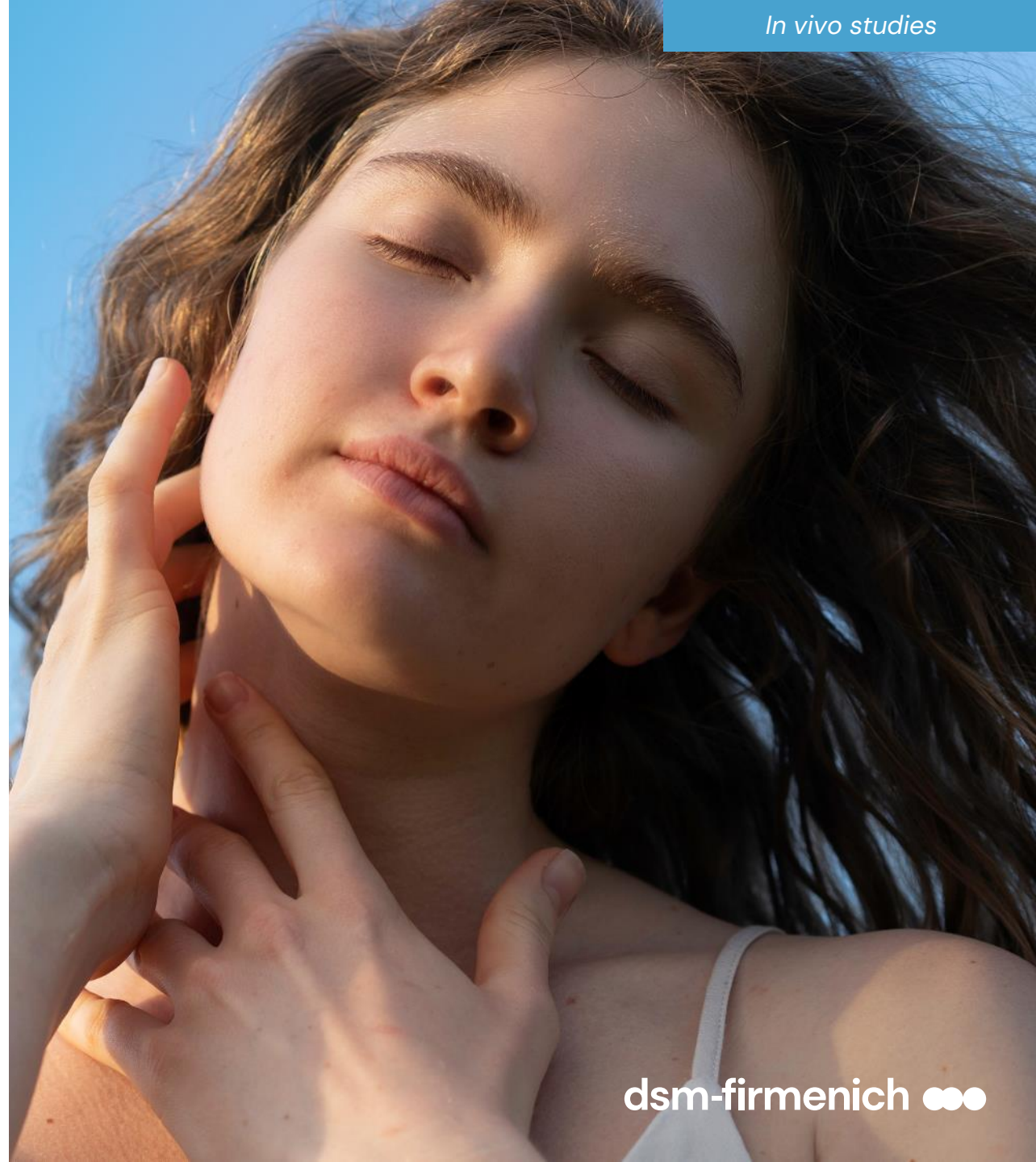
- Single-blind, randomized, placebo controlled *in-vivo* study (China)
- Data collection from December 2020 to February 2021
- Three groups of 30 volunteers per group, 18 – 50 years old (mean 39 y.)
- Main inclusion criterion: ASFS\* score between 24 and 40 (scalp flaking)
- Formulations: Shampoo placebo, Shampoo + 0.2% & 0.5% PENTAVITIN®
- 2 weeks wash-out + 28 days study (shampoo applied every 2 days)

### Parameters evaluated at starting point (D0), 24 h (D1) and 28 days (D28)

- Skin TEWL – Tewameter TM Nano (on top of head)
- Skin sebum – Meibometer MB560 (on top of head)
- Grade of ASFS dandruff – Dermatologist (on 8 areas)
- Scalp image by dermatoscope – VEOS HD2 Canfield
- Self questionnaire – Subjects enrolled in this study

| Ingredient           | INCI Name                                                                                                       | % w/w        |
|----------------------|-----------------------------------------------------------------------------------------------------------------|--------------|
| Water Dem            | AQUA                                                                                                            | To 100       |
| Texapon NSO – BZ     | SODIUM LAURETH SULFATE                                                                                          | 38.00        |
| Dehyton AB-30        | COCO-BETAINE                                                                                                    | 4.00         |
| PLANTAPON SF         | SODIUM COCOAMPHOACETATE, LAURYL GLUCOSIDE, GLYCERIN, SODIUM COCOYL GLUTAMATE, SODIUM LAURYL GLUCOSE CARBOXYLATE | 5.00         |
| PENTAVITIN®          | SACCHARIDE ISOMERATE, AQUA, CITRIC ACID, SODIUM CITRATE                                                         | 0.20 to 0.50 |
| L(+) Lactic Acid 90% | LACTIC ACID, AQUA                                                                                               | 0.40         |
| Euxyl K 700          | PHENOXYETHANOL, BENZYL ALCOHOL, POTASSIUM SORBATE, TOCOPHEROL, AQUA                                             | 0.80         |
| Sodium Chloride      | SODIUM CHLORIDE                                                                                                 | 0.70         |

\*ASFS: Adherent Scalp Flaking Score, Journal of Dermatological Treatment, 25:3, 232–236



# BeauPlex® VH

## In vivo studies / Hair growth

- Mono-center, Double-blind, randomized, placebo controlled in-vivo study (Europe)
- Data collection from Sept 2020 to March 2021
- Two groups of 30 volunteers per group, 18 – 65 years old (mean 45 y.) – 5 months study
- Standard shampoo formulation (SLES based) used by all volunteers of both groups

**Test product: Leave-on Formulation Placebo vs Leave-on + 1.5w/w% BeauPlex® VH**

| Ingredient                 | INCI Name                                                                                                                                              | % w/w  |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Water Dem                  | AQUA                                                                                                                                                   | To 100 |
| Cosphaderm Pentiol natural | PENTYLENE GLYCOL                                                                                                                                       | 5.00   |
| Cosmedia Ultragel 300      | POLYQUATERNIUM-37                                                                                                                                      | 0.90   |
| BeauPlex® VH               | NIACINAMIDE, CALCIUM PANTOTHENATE, SODIUM ASCORBYL PHOSPHATE, TOCOPHERYL ACETATE, PYRIDOXINE HCL, MALTODEXTRIN, SODIUM STARCH OCTENYLSUCCINATE, SILICA | 1.50   |
| Ethanol abs                | ALCOHOL                                                                                                                                                | 30.00  |

- Apply the product daily (4 mL) in the evening on the scalp (gentle massage, no rinse)
- Parameters at Day 0 & Day 150:
  - General photography of the hair
  - Cosmetic Trichogram
  - Trichoscan®: hair density & hair thickness



# BeauPlex® VH

## In vivo studies / Hair pigmentation\*

- Mono-center, Double-blind, randomized, placebo controlled *in-vivo* study (Europe)
- Data collection from July to Dec. 2020
- Two groups of 30 volunteers per group, 18 – 45 years old (mean 39 y.) – **4 months study**
- Standard shampoo formulation (SLES based) used by all volunteers of both groups

Test product: Leave-on Formulation Placebo vs Leave-on + 1.5w/w% BeauPlex® VH

| Ingredient                 | INCI Name                                                                                                                                              | % w/w  |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Water Dem                  | AQUA                                                                                                                                                   | To 100 |
| Cosphaderm Pentiol natural | PENTYLENE GLYCOL                                                                                                                                       | 5.00   |
| Cosmedia Ultragel 300      | POLYQUATERNIUM-37                                                                                                                                      | 0.90   |
| BeauPlex® VH               | NIACINAMIDE, CALCIUM PANTOTHENATE, SODIUM ASCORBYL PHOSPHATE, TOCOPHERYL ACETATE, PYRIDOXINE HCL, MALTODEXTRIN, SODIUM STARCH OCTENYLSUCCINATE, SILICA | 1.50   |
| Ethanol abs                | ALCOHOL                                                                                                                                                | 30.00  |

- Apply the product daily (4 mL) in the evening on the scalp (gentle massage, no rinse)
- Parameters at Day 0 & Day 120:  
General photography (grey scale)

\*Helps reduce the appearance of greying hair



# Vitamin B3 (Niacinamide)

## References

### **Penetration of Niacinamide in Hair & mechanical properties (thickening, break resistance, suppleness)**

- J.H. Thomas et al., A novel cosmetic approach to treat thinning hair, British Association of Dermatologists, 2011 165 (Suppl. 3), pp24–30

### **Skin & Scalp Barrier improvement – Reduction of TEWL**

- Z.D. Draelos, Male skin and ingredients relevant to male skin care, British Association of Dermatologists, 2012 166 (Suppl. 1), pp13–16
- S. Inoue, Nicotinamide increases biosynthesis of ceramides as well as other stratum corneum lipids to improve the epidermal permeability barrier, British Journal of Dermatology, 2000; 143: 524–531

# Pro-Vitamin B5

## References

### Biological effect on Keratinocytes

- R. Heise et al., Dexpanthenol Modulates Gene Expression in Skin Wound Healing in vivo, 2012, Skin Pharmacol Physiol; 25: 241–248

### Penetration of Panthenol in Hair & mechanical properties (thickening, break resistance, suppleness)

- J.H. Thomas et al., A novel cosmetic approach to treat thinning hair, British Association of Dermatologists, 2011 165 (Suppl. 3), pp24–30
- da Gama RM et al., Protective effect of conditioner agents on hair treated with oxidative hair dye, J Cosmet Dermatol 2018, 17, 1090–1095
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### Skin barrier & hydration properties of skin

- F. Ebner et al., Topical use of Dexpanthenol in skin disorders, 2002, Am J Clin Dermatol; 3 (6): 427–433
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# Vitamin B6

## References

### Sebum regulation and skin/scalp benefits

- Ohta H., Pyridoxine-3,4-Diacylates and Their Use in Cosmetics. J Soc Cosmetic Chemists (1965) 16, 349—358
- Saxena et al. Comparison of Healthy and Dandruff Scalp Microbiome Reveals the Role of Commensals in Scalp Health. Front Cel Infect Microbiol (2018) 8:346
- Vialkowitsch B., The treatment of seborrheic disease picture and falling hair with vitamin B6. Med Welt (1962) 22, 1260-1262 (article in German)
- Dobrev H., Clinical and instrumental study of the efficacy of a new sebum control cream. J Cosmet Dermatol (2007) 6, 113-118
- US6403110: Siddiqui et al., 2000 USA. Topical treatment for oily skin

### Hair Pigmentation\* & Hair thickening

- Shelley et al., Pyridoxine-Dependent Hair Pigmentation in Association With Homocystinuria (1972) 106, 228-230
- D'Agostini et al. Chemoprevention of smoke-induced alopecia in mice by oral administration of L-cystine and vitamin B6. J Dermatol Sci (2007) 46, 189-198
- D'Agostini et al. Chemoprevention of doxorubicin-induced alopecia in mice by dietary administration of L-cystine and vitamin B6. Arch Dermatol Res (2013) 305, 25-34
- US3826834: Reiches et al., filed 1974 in USA. Use of vitamin B6 for enlarging sub-normal hair bulbs and enhancing hair growth therefrom
- Brzezinska-Wcislo L., Evaluation of Vitamin B6 and Calcium Pantothenate Effectiveness on Hair Growth From Clinical and Trichographic Aspects for Treatment of Diffuse Alopecia in Women. Wiad Lek. (2001) 54(1-2):11-18 (only abstract, article in Polish)

\*Helps reduce the appearance of greying hair

# Vitamin B7

## References

### Microbiome & Scalp Care

- R. Saxena et al., Comparison of Healthy and Dandruff Scalp Microbiome Reveals the Role of Commensals in Scalp Health, *Frontiers in Cellular and Infection Microbiology*, 2018, 8–346.
- C-H Chiu, A Review: Hair Health, Concerns of Shampoo Ingredients and Scalp Nourishing Treatments, *Current Pharmaceutical Biotechnology*, 2015, 16, 1045–1052

### Seborrheic dermatitis & Hair Loss\*

- RM. Trüeb, Serum biotin levels in women complaining of hair loss, *Int J Trichol* 2016; 8: 73–77
- B. Piraccini, Biotin: overview of the treatment of diseases of cutaneous appendages and of hyperseborrhea, *G Ital Dermatol Venereol*, 2019, 154 (5), 557–566
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\*Helps prevent hair loss / Drug claim in some regions

# Vitamin C

## References

### Hair growth

- Sung. et al., The hair growth promoting effect of ascorbic acid 2-phosphate, a long-acting Vitamin C derivative. Journal of Dermatological Science (2006) 41, 150–152
- Kim et al. Induction of versican by ascorbic acid 2-phosphate in dermal papilla cells Journal of Dermatological Science (2006) 43, 60–62
- Sung et al. Transcriptional activation of CCN1 and CCN2, targets of canonical Wnt signal, by ascorbic acid 2-phosphate in human dermal papilla cells Journal of Dermatological Science (2008) 49, 256–259
- Kwack et al. L-Ascorbic acid 2-phosphate promotes elongation of hair shafts via the secretion of insulin-like growth factor-1 from dermal papilla cells through phosphatidylinositol 3-kinase British Journal of Dermatology 2009 160, pp1157–1162
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### Antioxidant & UV Protection

- Lin et al. UV photoprotection by combination topical antioxidants vitamin C and vitamin E, J AM ACAD DERMATOL, 2003, 48(6):866–874
- Chikvaidze et al. ESR study of photoinduced free radicals by visible light in hair and the effects of ascorbic acid (vitamin C), International Journal of Cosmetic Science, 2011, 33, 322–327

# Vitamin E

## References

### Hair growth– Tocotrienol

- Beoy. et al. Effects of Tocotrienol Supplementation on Hair Growth in Human Volunteers Tropical Life Sciences Research, 2010, 21(2), 91–99
- Kamimura et al. Effect of Topical Application of Vitamin E on the Hair Growth of Rabbits, 1965, J Vitaminol, 11:1–8

### Antioxidant & UV protection

- Prasertpol et al. Nanostructured lipid carriers: A novel hair protective product preventing hair damage and discoloration from UV radiation and thermal treatment, 2020, J Photochem Photobiol B, 204:111769
- Packer et al. Antioxidants and the Response of Skin to Oxidative Stress: Vitamin E as a Key Indicator Skin Pharmacol Appl Skin Physiol, 2002, 15:282–290
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- Lin et al. UV photoprotection by combination topical antioxidants vitamin C and vitamin E J Am Acad Dermatol, 2003, 48(6):866–874

# ALPAFLOR® ALP-SEBUM CB

## References

### Sebum reduction for scalp (and skin) 5- $\alpha$ -Reductase-Inhibition

- D. Lesuisse, Determination of Oenothain B as the Active 5- $\alpha$ -Reductase-Inhibiting Principle of the Folk Medicine *Epilobium parviflorum*, J. Nat. Prod. 1996, 59, 490–492
- B. Ducrey B, Inhibition of 5 alpha-reductase and aromatase by the ellagitannins oenothain A and oenothain B from *Epilobium* species. Planta Med. 1997, 63(2):111–4.

### Anti inflammatory & anti-oxidant properties

- A. Kiss, Oenothain B's contribution to the anti-inflammatory and antioxidant activity of *Epilobium* sp. Phytomedicine. 2011; 18: 557–60.
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- I. Schepetkin, Therapeutic Potential of Polyphenols from *Epilobium Angustifolium* (Fireweed), Phytother. Res. (2016), 30: 1287–1297

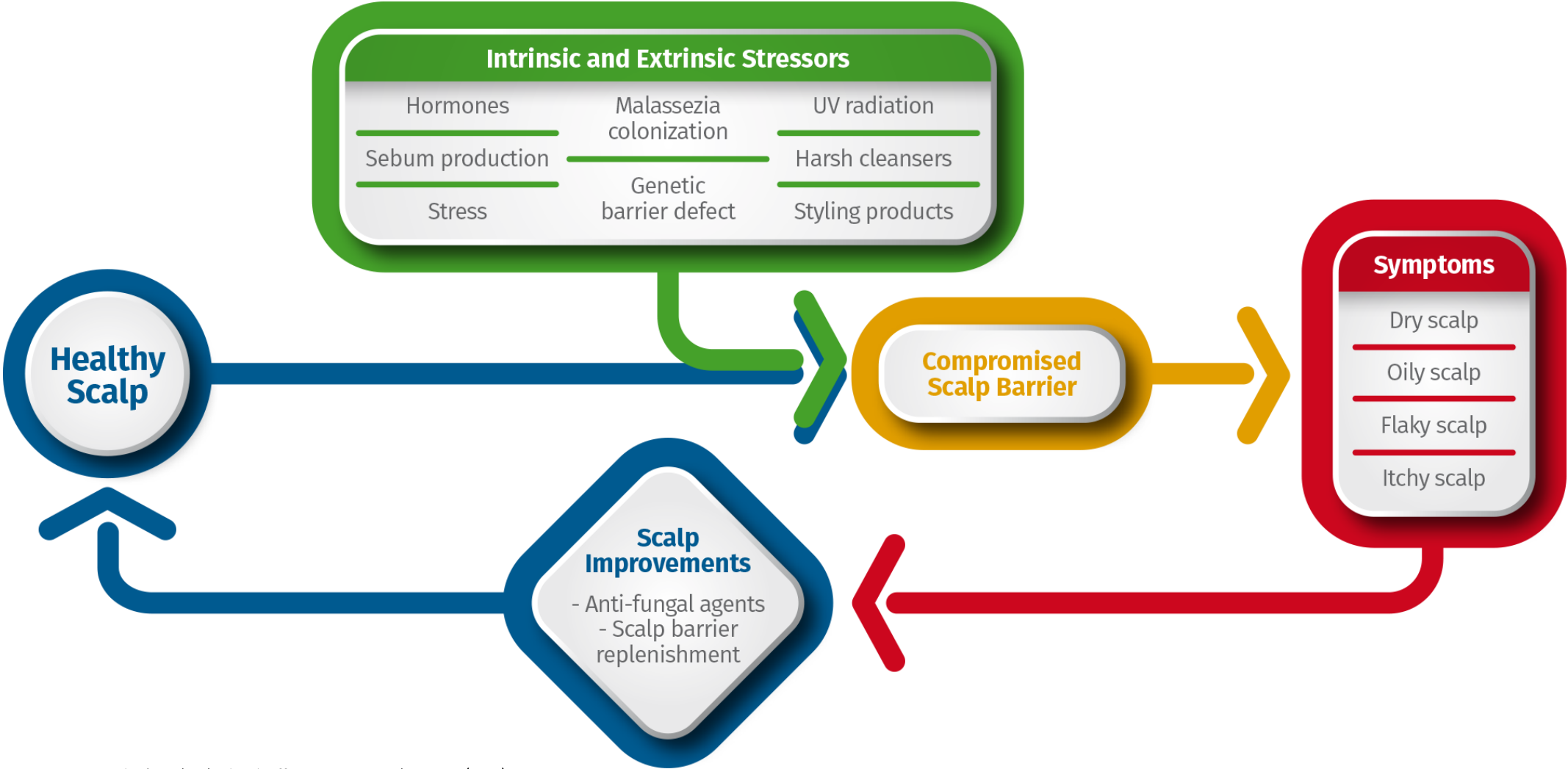
### Hair Loss\*

- R. Hoffmann, Does interleukin-1 induce hair loss?, Dermatology 1995;191:273–275

DHT= Dihydrotestosterone. \* = commercial form

\*Helps prevent hair loss / Drug claim in some regions

# How to get a healthy scalp?



Turner et al. Stratum corneum dysfunction in dandruff. Int J Cosmet Sci 34:298, (2012)

# North America: acceptable and unacceptable Cosmetic Claims\*

## Acceptable (Cosmetic) –subject to substantiation

- Removes loose dandruff flakes from the hair
- Makes hair stronger
- Fortifies the hair
- Looks thicker
- Thickens hair
- Adds body
- Thickens hair shaft
- Repairs split ends/dry/damaged hair
- Revitalizes hair/hair's beauty
- Nourishes hair/hair nutrient (must qualify in cosmetic sense – moisturize, shine, texture, softness, beauty)
- Healthy hair (in the context of appearance)
- Root penetrating (i.e. thoroughness, root to tip)
- Contains sunscreen

## Unacceptable (Drug)

- Controls dandruff
- Eliminates dandruff
- Dandruff shampoo
- Anti-dandruff shampoo
- Stimulates hair follicles
- Alopecia
- Prevents/treats alopecia
- Prevents hair loss/hair thinning
- Replaces thinning hair
- Restores hair cells
- Stimulates hair follicles
- Stimulates hair growth
- Deeply root penetrating (i.e. any action under the scalp)
- SPF

\*subject to substantiation

## Top 15 of mind concerns across the Globe

Quite differentiated picture across the countries

| Top Concerns           | Total  | France | China  | Japan  | US     | Brazil |
|------------------------|--------|--------|--------|--------|--------|--------|
| Dandruff               | 53.00% | 50%    | 62.00% | 36.00% | 54.00% | 57.00% |
| Hair loss              | 53.00% | 60.0%  | 49.00% | 51.00% | 44.00% | 60.0%  |
| Itchy scalp            | 50.00% | 44.00% | 57.00% | 53.00% | 48.00% | 52.00% |
| Greasiness             | 45.00% | 42.00% | 57.00% | 40.0%  | 37.00% | 53.00% |
| Difficult to style     | 45.00% | 39.00% | 33.00% | 54.00% | 51.00% | 45%    |
| Hair dryness           | 45.00% | 38.00% | 43.00% | 57.00% | 54.00% | 39.00% |
| Split ends             | 41.00% | 37%    | 38.00% | 34.00% | 46.00% | 45.00% |
| Scalp dryness          | 38.00% | 30.0%  | 41.00% | 41%    | 57.00% | 22.00% |
| Frizz                  | 38.00% | 26.00% | 14.00% | 48.00% | 45.00% | 53.00% |
| Dull hair              | 37.00% | 29.00% | 42.00% | 48.00% | 40.0%  | 31.00% |
| Lack of volume         | 37.00% | 38.00% | 40.0%  | 38.00% | 39.00% | 32.00% |
| Hair graying           | 35.00% | 32.00% | 25.00% | 40.0%  | 37.00% | 38.00% |
| Hair thinning          | 33.00% | 22%    | 33%    | 41.00% | 40.0%  | 33%    |
| Damage f. environ.     | 28.00% | 21.00% | 25.00% | 30.0%  | 35.00% | 31.00% |
| Damage f. phys./ chem. | 26.00% | 12.00% | 23.00% | 29.00% | 33.00% | 30.0%  |

Source: dsm-firmenich Internal Research 2021