

Hairflux®

The Extraordinary Hair & Scalp Care Revolution



Key Hair Care Market Drivers



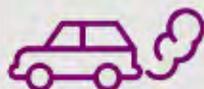
BIO-INSPIRATION

Bio-inspired molecules are on spotlight. Safety, wellness and transparency are today's consumers top attributes.



NATURAL BEAUTY

Waves and curls became the new mainstream on beauty, and brands should empower these consumers by offering customized options.



AGAINST-ELEMENTS

Our hair is daily exposed to different environmental aggressors that can contribute to hair damage, like UV rays and pollution.



Consumer Needs

Damage repair is still among the top attributes for haircare consumers. More than having beautiful hair, consumers are seeking natural-inspired ingredients that nourish and protect their hair and scalp.

INSPIRED BY SKIN

Skin Care ingredients are influencing the hair care market. With the increasing awareness on the importance of a healthy scalp for a beautiful hair, consumers adapted their haircare.

GENTLE & SAFE

Health, safety and transparency became top attributes! Mild-to-skin ingredients with inspiration on skin-/hair-identical molecules are gaining importance.

What is your main hair care concern?

Different requirements around the globe



"Every day I expose my hair to sun and heat. I would be interested to add a UV-and-heat-protector to my daily haircare routine."

Diane Smith, 26, lives in San Francisco*

80% of Americans would be interested in haircare products offering **sun protection** for their hair and scalp.



"I do my workout seven-days-a-week and normally wash my hair twice-a-day. I feel my scalp very irritated, itching and dry. I am looking for an intensive scalp care treatment."

Mark Müller, 34, lives in Hamburg*

Across the globe, **60%** of women and **40%** of men claim to have **sensitive scalp**, with common symptoms like dryness, itching and erythema.



"I live in a big and very polluted city and can feel these effects on my hair: it is frizzy, breaks and tangles easily. For me, it would be important to have an intensive hair & scalp repairing treatment."

Chang Liu, 28, lives in Shanghai*

In China, **nearly half** of haircare consumers believe that the **health of their scalp** is the most important reason for **healthy hair**.



"I was used to straight my hair, but after a long period exposing it to severe damage I decided to embrace my curls. I need deep repairing and moisturizing treatments."

Adriana Silva, 30, lives in Rio de Janeiro*

In Brazil women use **3x as many post-treatment products** as American women, in order to **repair damage**.

Source: Mintel, Internet blogs

* All the characters shown in this slide are merely fictional.

Bleaching, Straightening, UV...

Implications for Hair and Scalp

The triggers

Our hair and scalp is daily exposed to different environmental aggressors like UV rays and pollution. In addition harsh styling treatments like straightening or bleaching will lead to **hair damage** and **irritation of the scalp**.

The implications

Irritation of the scalp: induction of pro-inflammatory markers like IL-1 will cause symptoms like itching and erythema.

Damage of hair structure: increase of hair breakage and hair swelling, deterioration of Cuticula structure.

The solution

Multifunctional active with the potential to calm the scalp and repair damaged hair.

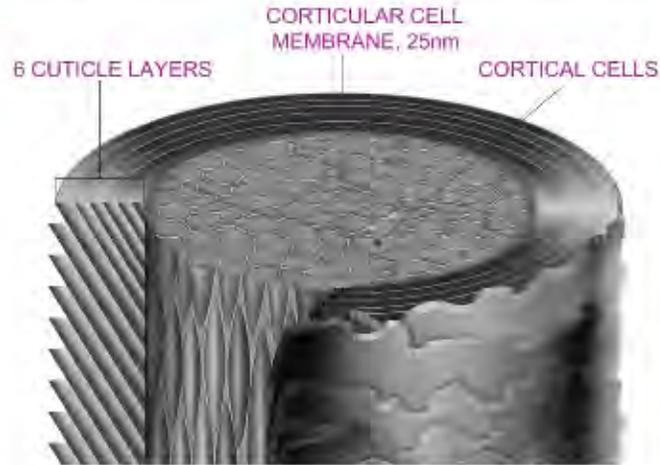
Ceramides and various **oils** are known to have calming and anti-inflammatory skin but also hair repair effect.



Hairflux® meets Hair and Scalp Care needs

Santiago et al.; International Journal of Molecular Science; 2017

Ceramides in Hair and Skin (Scalp)



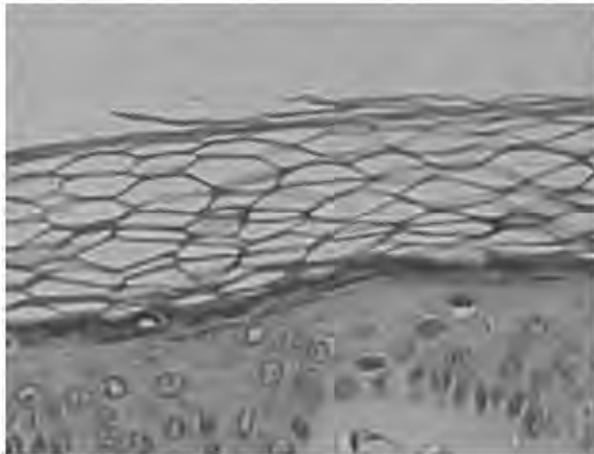
HAIR FIBER MORPHOLOGY

CELL MEMBRANE COMPLEX

- Kit between different hair cells
- Maintains cohesion of cortex and cuticular cells
- Consists of Ceramides plus additional polar lipids

COMPOSITION OF CORTEX-CORTEX-CMC

Fatty acids	appr. 70%
Cholesterol Sulfate	appr. 14%
Cholesterol	appr. 7%
Ceramides	appr. 7%



SKIN (SCALP) BARRIER MORPHOLOGY

STRATUM CORNEUM

- Keeps water-rich organs from drying out by preventing excessive water loss
- Consists of Ceramides plus other fatty acids and cholesterol

COMPOSITION OF SKIN BARRIER

Fatty acids	appr. 11%
Cholesterol Sulfate	appr. 18%
Cholesterol	appr. 24%
Ceramides	appr. 47%

Source: C.R. Robbins: The cell membrane complex: Three related but different cellular cohesion components of mammalian hair fibers, *J. Cosmet. Sci.*, **60**, 437-465 (July/August 2009)
 Highly Sensitive Determination of Diverse Ceramides in Human Hair Using Reversed-Phase High-Performance Liquid Chromatography-Electrospray Ionization Mass Spectrometry,
 Yoshinori Masukawa & Hisashi Tsujimura

Source: „Trends in stratum corneum research and the management of dry skin conditions“, AVR Consulting Ltd, 26 Shavington Way, Kingsmead, Northwich, Cheshire CW98FH, UK,
International Journal of Cosmetic Science, 2003, **25**, 63-95

Application of Ceramides and Oils on Hair and Scalp

Beneficial effects on damage repair

WHY AFFECTED HAIR / SCALP WILL BENEFIT FROM APPLICATION OF CERAMIDES + OILS

The cell membrane complex and scalp barrier will be **refilled** with lacking Ceramides.

Cohesion of hair cells will be improved.

Hair will loose less protein fragments built by chemical degradation (like straightening) – **reduction of hair breakage**.

An intact CMC will lead to a more hydrophobic hair/hair surface and a reduced absorption of water – **reduction of hair swelling**.

Anti-inflammatory properties of Ceramides together with the soothing properties of olive oil will **calm down irritated scalp**.

The solution



Hairflux[®]

The power of olives married to the well-known strength of Ceramides.

More than 20 years
experience of
Ceramide
engineering



CERAMIDES

Exist in hair and skin, as part of skin barrier and hair cell membrane complex (CMC).
Build together with other polar lipids a sort of kit between the hair cells.

THE POWER OF OLIVES

Truly powerhouse for skin and hair. Part of essential healthy diets, offering multiple benefits.
Natural skin soothing and hair repairing ingredient.

PROPERTIES		APPLICATIONS		THE PRODUCT
INCI (proposed)	Olea Europaea (Olive) Fruit Oil; Ricinus Communis (Castor) Seed Oil; Ceramide NG		Scalp care treatments (serums, tonics)	
Product appearance	Paste, slightly yellowish		Post-chemical & repairing hair masks	
Ceramide concentration	> 5%		Conditioners	
Origin	Biotechnology process + mild reactions (fully COSMOS- conform)		Shampoos	
Recommended use level	1% proven efficacy			
Solubility	Soluble in conventional emollients of a broad polarity range			

State-of-the-art claim substantiation

Overview *in vitro* and *in vivo* studies based on Hairflux®

Scalp Care efficacy

In vitro study on
epidermal skin
models (EpiCS)



In vivo study on scalp
& dry skin



Hair Care efficacy

Repair of inner
hair structure
after bleaching
(virgin Caucasian hair)



Reduction of hair
breakage
(after acidic straightening
and hot drying + combing)



In vitro test analysis

Inflammatory capacity on epidermal skin models (EpiCS)

In vitro study

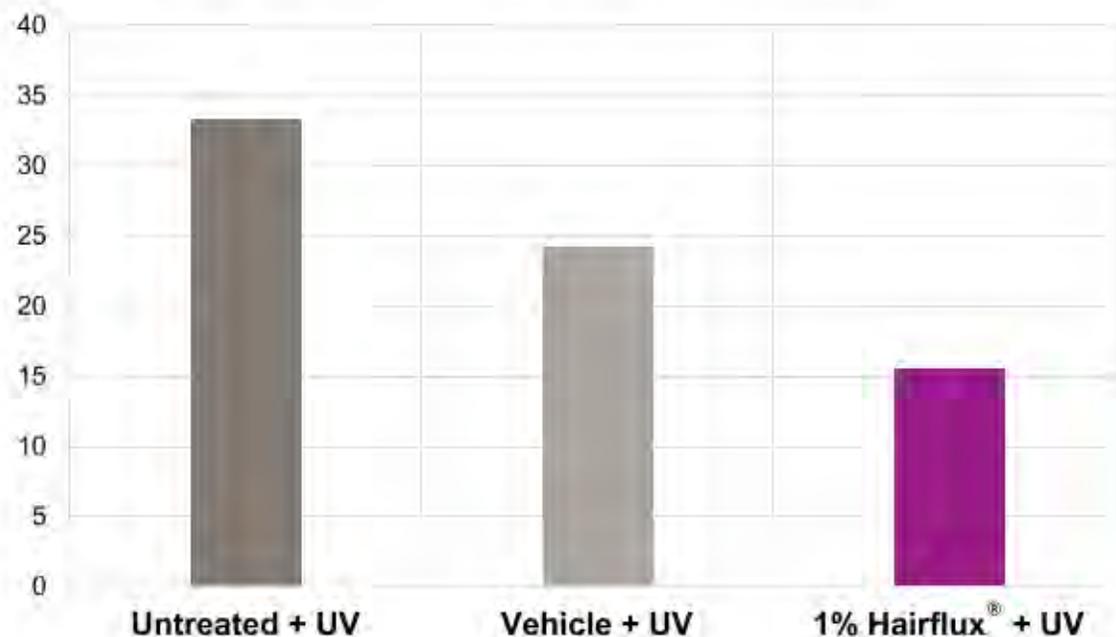


Keratinocyte skin models exposed to **UV stress**



1h before & after UV stress
(9300 mJ/cm² UVA + 1000 mJ/cm² UVB)

ELISA 48h: IL-1 in the supernatant [pg/ml]



Hairflux[®] provides a significant reduction of IL-1, leading to **reduced inflammatory capacity**.

Test formulation and detailed test design

In vivo scalp study

Visible improvement of irritated scalp conditions by Hairflux®



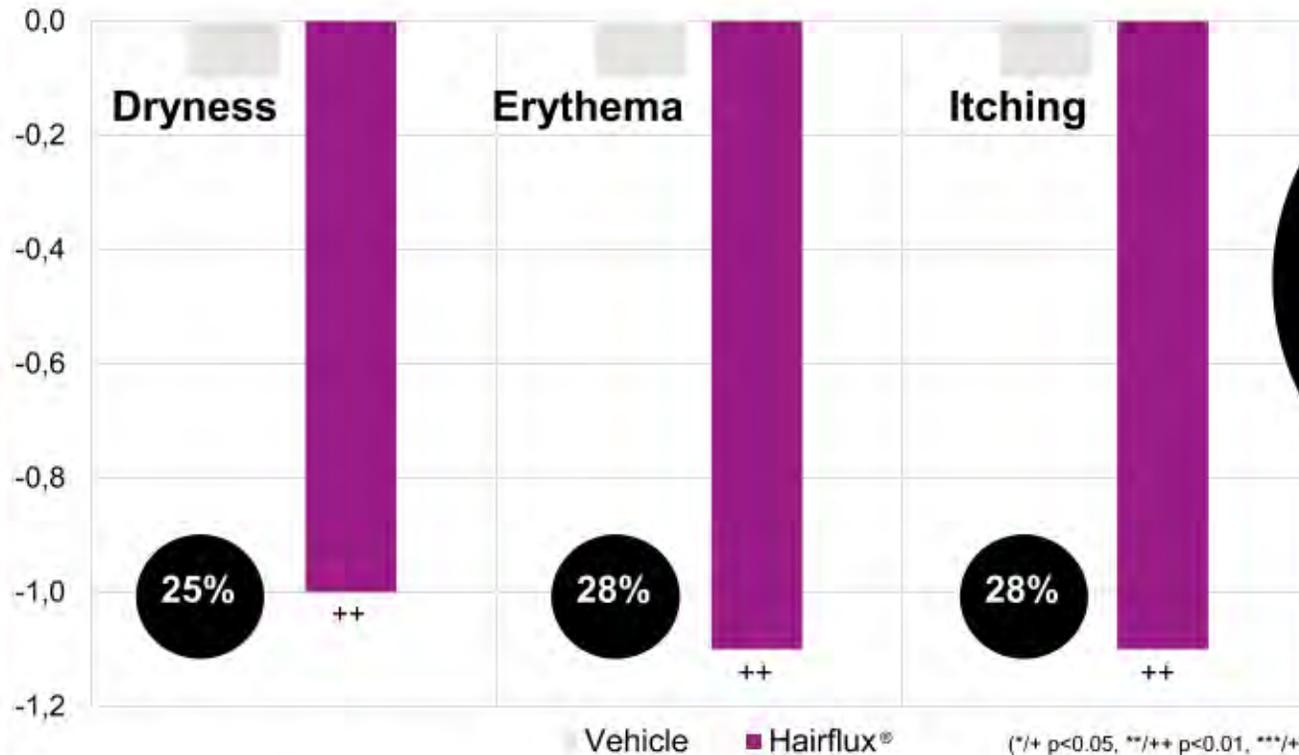
40 volunteers, age range 18-70, irritated scalp



2 weeks (1 week wash-out phase prior to study)



hair tonic with 1% Hairflux® or without active (vehicle)



Itching, dryness and erythema are significantly reduced with the daily use of a hair tonic containing 1% Hairflux®.

Test formulation and detailed test design

In vivo scalp study

Visible improvement of irritated scalp conditions by Hairflux®



In vivo results on skin

Perceivable improvement after the use of Hairflux® on dry skin



25 panelists, dry skin

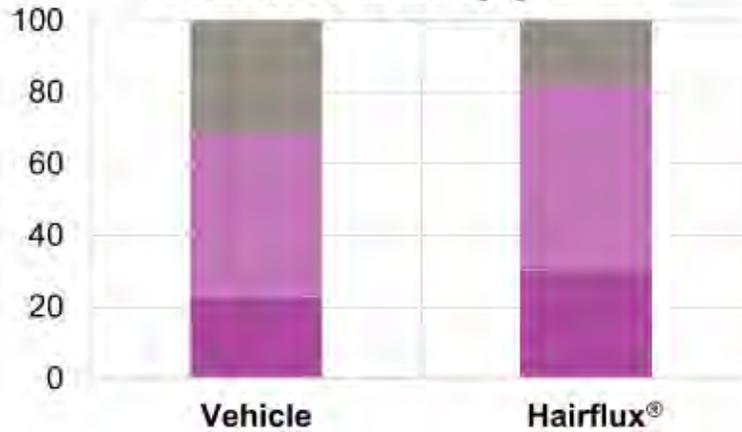


Body lotion with 1% Hairflux®, vehicle

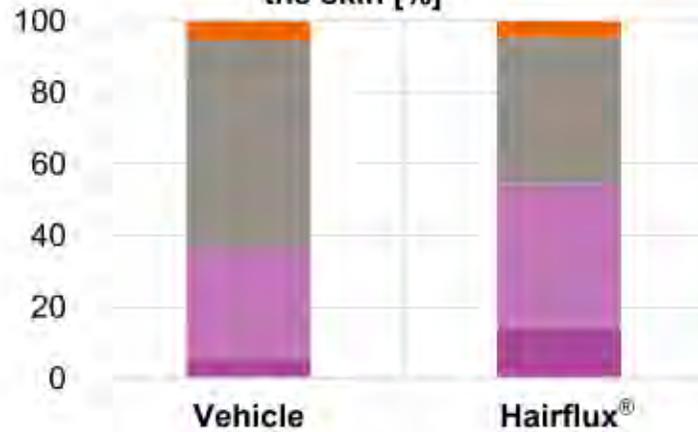


2x daily, 2 weeks
Visioscan VC 98, questionnaire

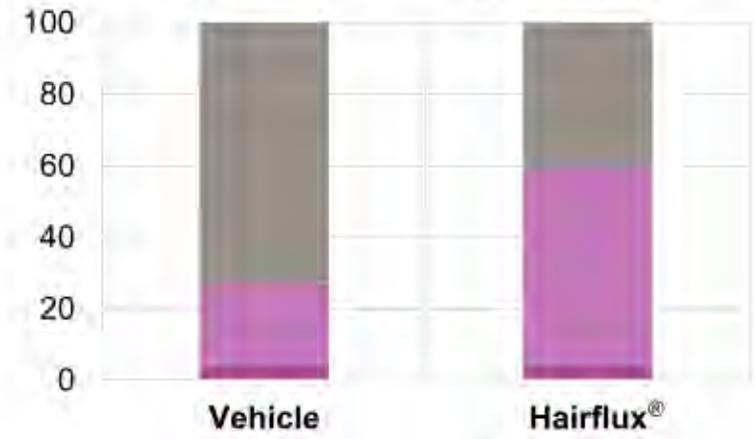
The product provides sufficient moisture to the skin [%]



The product reduces the scaliness of the skin [%]



My skin condition improved [%]



- I don't agree at all
- I don't agree
- I neither agree or don't agree
- I agree
- I fully agree

Panelists confirm a reduction of scaliness measured with the Visioscan camera.

Panelists stated a moisturizing effect and an improvement of the skin condition after application of Hairflux® compared to the vehicle.

Test formulation and detailed test design

In vivo study

Reduction of scaliness and roughness of the skin



25 panelists, dry skin

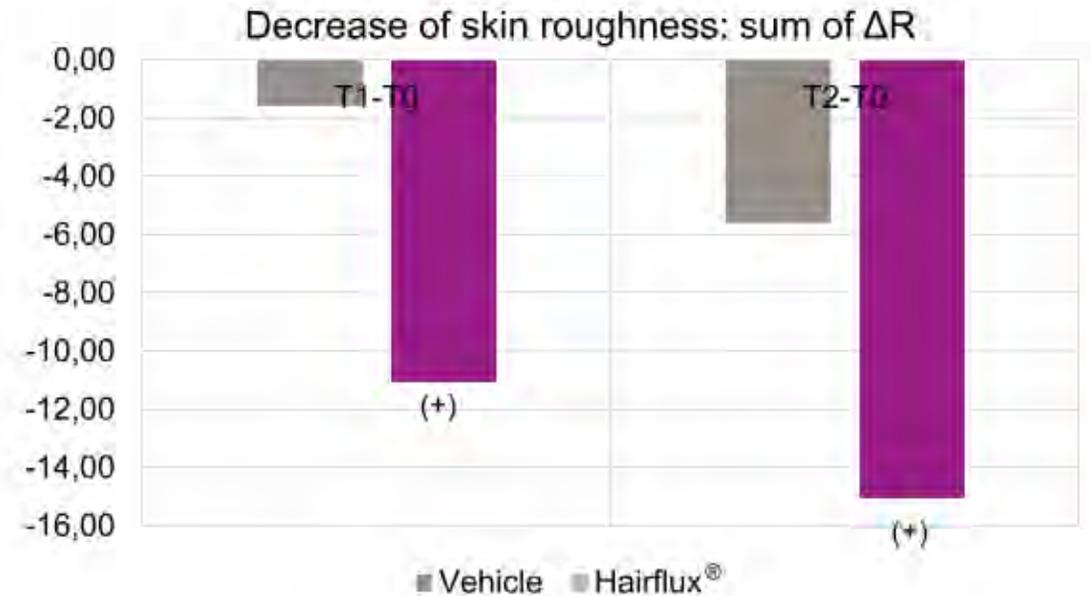
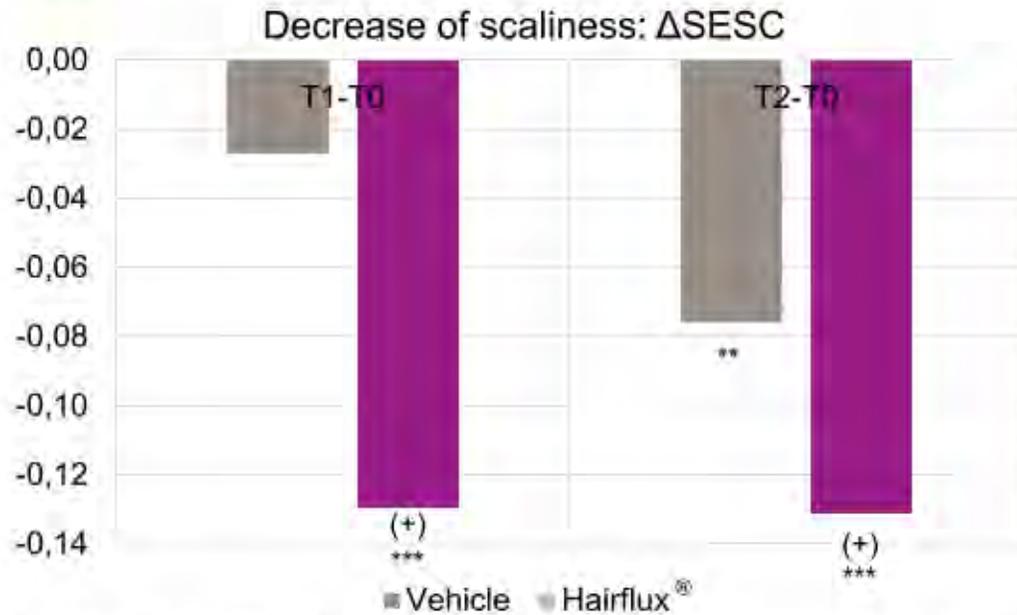


Body lotion with 1% Hairflux®, vehicle



2x daily, 2 weeks

Visioscan VC 98, questionnaire



(*+ p<0.05, **/+ p<0.01, ***/+ p<0.001, * compared to T0, + compared to vehicle)

1% Hairflux® reduce skin scaliness as well as skin roughness significantly!

Hair damage caused by bleaching

Repair of the inner hair structure of bleached hair



Virgin Caucasian hair
damaged by **bleaching**



Conditioner with or without
1% Hairflux®

Dia-Stron swelling rate
measurement

**1% Hairflux®
substantially
repairs
damages on
hair caused by
bleaching.**

Swelling Rate [$\mu\text{m}^2/\text{s}$]



(* / + $p < 0.05$, ** / ++ $p < 0.01$, *** / +++ $p < 0.001$, * compared to T0, + compared to vehicle)

Hair damage caused by Brazilian acidic straightening

Reduced hair breakage of straightened hair



Virgin Ethnic hair damaged by acidic straightening

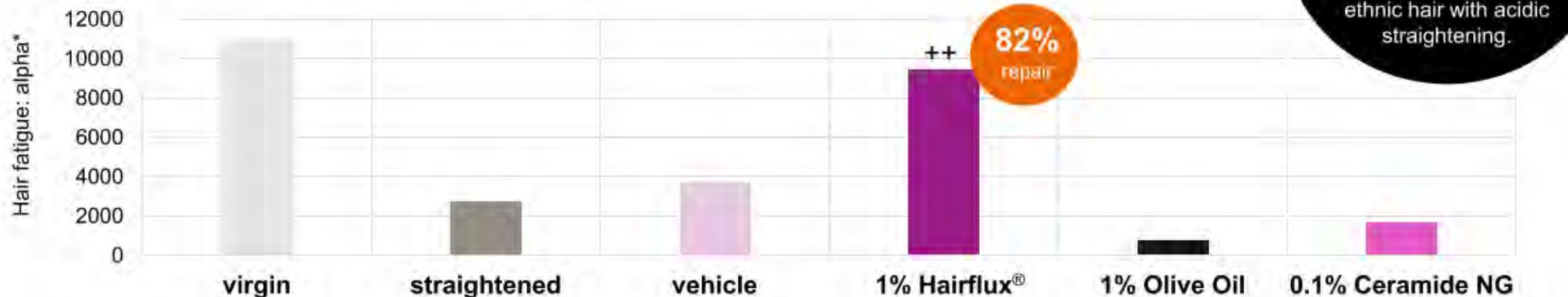


Conditioner with or without 1% Hairflux®

Dia-Stron hair fatigue measurement

Only the synergistic combination of olive-based ceramide and vegetable oils achieved a repair effect of 82% on ethnic hair with acidic straightening.

Hair fatigue: alpha (number of cycles which appr. 1/3 of the fibers survived)



*alpha is the number of cycles which approx. one third of the hair fibers survived

(*/+ p<0.05, **/++ p<0.01, ***/+++ p<0.001, + compared to T0, + compared to vehicle)

In Brazil, besides the increasing acceptance of natural curls,
48% of female consumers still use hair straightening due to its wash-and-go convenience.

Improvement of hair resistance

Reduced hair breakage after hot drying and combing



Virgin Caucasian hair tresses



Use of conditioner with or without 1% Hairflux® or 1% natural oils

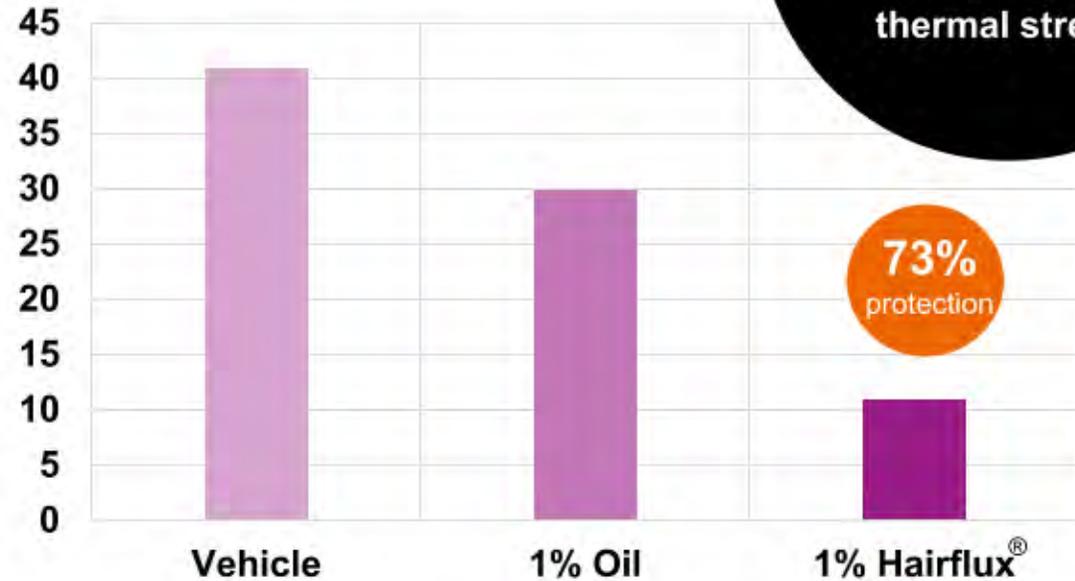
1500 brush strokes with hot air drying

Measurement of broken hair fibers



1% Hairflux® efficiently protects hair fibers against mechanical and thermal stress.

Hair breakage [number of broken fibers]





Hairflux®

PROVEN EFFICACY

SUMMARY CLAIM SUBSTANTIATION

BASED ON 1% HAIRFLUX®

- + Provides **anti-inflammatory capacity** to calm down irritated scalp conditions
- + **Visible improvement** of irritated scalp (itching, erythema, dryness)
- + **Perceivable improvement** on dry skin
- + **Reduction of scaliness** and roughness of the skin
- + **Repair of the inner hair structure** of bleached hair
- + **Reduced hair breakage** of straightened hair
- + **Protection of hair fibers** against mechanical and thermal stress

Working with Hairflux®

FORMULATION HINTS

Recommended usage concentration: **1%**

Solubility: Hairflux® is not water soluble, it is **soluble in polar to medium polar emollients**.

Processability: Hairflux® needs to be **hot processed**.

O/W emulsion based products (conditioner, hair mask etc.): Add Hairflux® to the oil phase of the formulation and heat it up until the Hairflux® is completely solubilized. Then the emulsion is prepared in the normal way.

Clear aqueous based formulations (tonics, shampoos etc): Because Hairflux® is not water soluble the addition of a solubilizer is necessary. Suitable solubilizers are for example TAGAT® CH 40 or TEGO® SMO 80 V.



Get inspired

3 Minute Restore Conditioner (JB 04/18-2) + Relieving Hair & Scalp Tonic (MAC 01/3/4)

3 Minute Restore Conditioner

Phase	Ingredients	w/w%
A	TEGO® Alkanol 1618 (Cetearyl Alcohol)	6.00
	VARISOFT® BT 85 Pellets (Behentrimonium Chloride)	2.50
	VARISOFT® EQ 100 (Bis-(Isostearoyl/Oleoyl Isopropyl) Dimonium Methosulfate)	1.00
	Hairflux®	1.00
B	ABIL® Quat 3272 (Quaternium-80)	2.00
	Glycerin	2.00
	Water	85.50
Z	Preservative, Perfume	q.s.

Relieving Hair & Scalp Tonic

Phase	Ingredients	w/w%
A	VARISOFT® PATC (Palmitamidopropyltrimonium Chloride)	3.00
	Hairflux®	1.00
	TAGAT® CH 40 (PEG-40 Hydrogenated Castor Oil)	6.00
B	Water	90.00
Z	Preservative	q.s.

PREPARATION

1. Heat phase A and B to 70 °C.
2. Add phase B to phase A without stirring.
3. Homogenize.
4. Cool slowly while stirring.



PREPARATION

1. Heat Hairflux®, TAGAT® CH 40 and VARISOFT® PATC to appr. 70 °C until the solution is clear.
2. Add the water slowly step by step.

Hairflux® in a nutshell



Bio-inspired ingredient, combining relevant Sphinganine-based Ceramides to natural oils.

Highly efficient **at low concentration (1%)**.

Inspired by **market topmost trends**.

Perceivable effects on hair & skin.

Broad application profile on both hair & scalp.

The Extraordinary Hair & Scalp Care Revolution

Exceptionally high **formulation flexibility** in cosmetic formulations.

Outstanding performance on different hair types, with different types of damage.

Mild & Pure solution, without preservatives and anti-oxidants.

Proven efficacy on the repair of damage caused by Brazilian blowout (progressive blow-dry).

Cost-efficient alternative with premium application.



EVONIK

POWER TO CREATE

In vivo scalp care study

Test design (1/2)

Number of panelists	40 (20 per test formulation)
Panelists	Men and women aged between 18-70 years with dry and itching scalp and scalp erythema.
Test formulations	Hair tonic with 1% Hairflux or without active (vehicle).
Test desing	<ol style="list-style-type: none">1. 7 days wash-out period with a neutral shampoo.2. Every panelist got one test formulation which he/she applied twice daily for 2 weeks. During the application the panelists continued to use the neutral shampoo.
Measurement	Digital images (Fotofinder Dermoscope 2.0). Clinical examination of the panelists in order to score the degree of scalp dryness, erythema and itching sensation according to the following 4-point clinical scale: 0 = absent; 1 = mild; 2 = moderate; 3 = severe.
Time points	Start and after 14 days
Test period	November-December 2017

Test formulations scalp care study

Test design (2/2)

Hair Tonic		
Formulation	A	C
VARISOFT® PATC (Palmitamidopropyltrimonium chloride)	3.0	3.0
TAGAT® CH 40 (PEG-40 Hydrogenated Castor Oil)	6.0	6.0
Hairflux®		1.0
Water	90.3	89.3
Euxyl PE 9010	0.7	0.7

Neutral Shampoo	
Formulation	
Mild Baby Shampoo (UM 216/25)	
TAGAT® CH 40 (PEG-40 Hydrogenated Castor Oil)	2.3
TEGOSOFT® LSE 65 K (Sucrose Cocoate)	1.8
Lauryl Glucoside (50%)	1.7
Sodium Laureth Sulfate (28%)	6.7
Water	67.2
TEGO® Betain F 50 (Cocamidopropyl Betaine)	13.5
TEGO® Betain 810 (Capryl/Capramidopropyl Betaine)	2.7
ANTIL® 120 Plus (PEG-120 Methyl Glucose Dioleate)	1.1
ANTIL® 171 (PEG-18 Glyceryl Oleate/Cocoate)	3.0
Preservative, Perfume	q.s.

Test results

In-vitro study

Keratinocyte skin models

Cell type	Keratinocyte skin models (EpiCS)		Vehicle	HairFlux
Stress	UV irradiation	AXOL® C62 (Glyceryl Stearate Citrate)	1.50	1.50
Topical application of test formulation	1h before and after UV stress	TEGO® Alkanol 1618 (Cetearyl Alcohol)	1.00	1.00
Test formulation	O/W emulsion with and without 1% Hairflux®	Castor Oil	8.00	8.00
Readouts	IL-1: gene expression (qRT-PCR), protein release (ELISA)	Hairflux®		1.00
		Water	89.50	88.50
		pH (Sodium Hydroxide 10%)	6 - 6.20	6 - 6.20

Test results

In vivo study

Dry skin

Number of panelists	23-25/test formulation
Test formulation	Body lotion with 1% Hairflux®, vehicle
Test area	inner forearm
Application	twice daily for 2 weeks, every panelist got two formulations (incomplete block design)
Measurement	Visioscan VC 98, questionnaire
Time points	start, 1 and 2 weeks

Test results

	CD 1042	170	959
A	AXOL® C 62 Pellets (Glyceryl Stearate Citrate)	2.00	2.00
	TEGO® Alkanol 1618 (Cetearyl Alcohol)	1.00	1.00
	TEGOSOFT® CT (Caprylic/Capric Triglyceride)	4.00	4.00
	TEGOSOFT® TN (C12-15 Alkyl Benzoate)	4.00	4.00
	Hairflux®		1.00
B	Water	86.20	85.20
C	TEGO® Carbomer 141 (Carbomer)	0.20	0.20
	TEGOSOFT® CT (Caprylic/Capric Triglyceride)	0.80	0.80
D	Phenoxyethanol; Ethylhexylglycerin (Euxyl PE 9010, Schülke & Mayr GmbH)	1.00	1.00
E	Sodium Hydroxide (10 %)	0.70	0.70
F	Perfume	0.10	0.10

Hair fatigue of acidic straightened hair

Test design

Hair quality	Virgin ethnic hair
Hair damage	Acidic straightened with a standard salon formulation in combination with a flat iron
Test formulation	Conditioner with 1% Hairflux®, 1% Olive Oil, 0.1% Ceramide NG or without active ingredient (vehicle)
Hair treatment	<ol style="list-style-type: none">1. Washing with SLES (8%)2. Application of the test formulation, leave-in-time 5 min3. Rinsing under tap water for 1 min Step 1-3 were performed five times
Read out	Measurement of hair fatigue (Dia-Stron Cyclic Tester)

45% of **Brazilian women** have **curly/kinky hair**, and according to a recent study, they use **22%** more **repairing treatments** compared to women with straight hair.

Source: BrazilBeauty News

You need to know!

Test results