

PENTAVITIN®

*Smart moisturizer
from head to toe*



April 2026

Naturals | The science of nature

dsm-firmenich 

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Dry skin affects millions of people!

Dry skin is skin that doesn't have enough moisture and oil in it to keep it feeling soft.

Dry skin is nature's way of warning you that the protective elements of your skin barrier is not working properly anymore.

Dry skin feels:

- Tight
- Rough
- Itchy
- Irritated

Dry skin looks:

- Less healthy
- Dull
- Older
- Slight to severe flaking, scaling or cracked



What to know about dry skin ...

Some people are more at risk of dry skin*

- People over 40 — as people get older, their skin makes less NMF (Natural Moisturizing Factor) and oil
- People with brown, black, or fair skin
- People with jobs that mean their hands are in water a lot, such as nurses and hairdressers
- People who live in cold climates
- People who smoke

Causes of dry skin include:

- Living in cold, dry conditions
- Using heat sources, such as central heating, that dry out the air
- Using harsh deodorants or cleaning products
- Taking long, hot showers or baths

*American Academy of Dermatology Association



People with dry skin need ...



Desired outcome
Quick & long-lasting



Key need
Get dry skin back to life



Trouble shooting
Targeted problem areas



Smile & confidence



High demand for skin care products for dry skin

83%

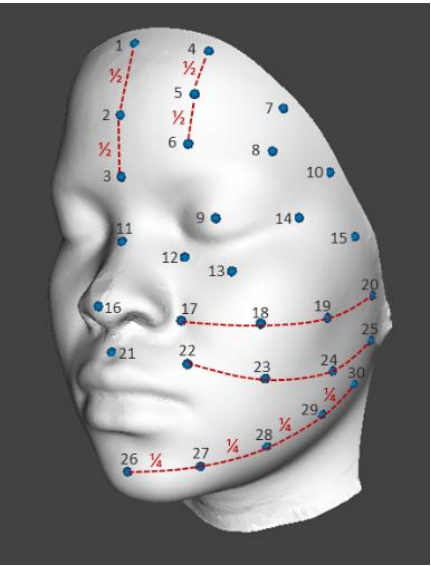
of consumers are actively looking for skin care products that are created for dry skin

Some examples ...



And this is... what dsm-firmenich scientists discovered

dsm-firmenich facial color hydration mapping technology displays complex hydration data in an easy-to-understand way with a "wow" effect

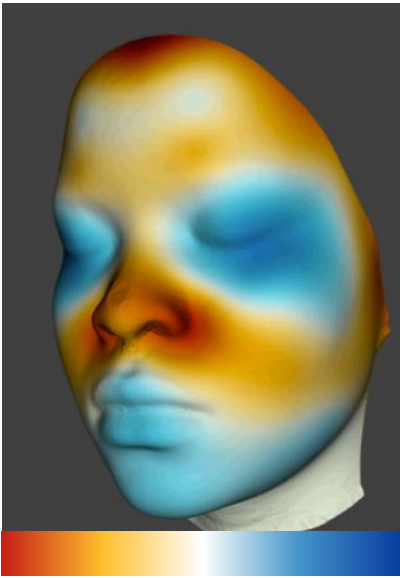


30 measurings sites on the face are selected



Site #	Description of site	Chinese	Caucasians	Indians	Black Africans
(a) TEWL					
All sites					
Forehead region					
01	Forehead, central, upper	18.5 ± 3.5	12.4 ± 2.4	20.4 ± 2.6	16.7 ± 1.6
02	Forehead, central, middle	17.4 ± 3.1	10.6 ± 2.5	17.5 ± 1.8	14.5 ± 1.2
03	Forehead, central, lower	18.5 ± 3.5	12.4 ± 2.9	16.3 ± 4.4	15.9 ± 1.5
04	Forehead, middle left, upper	21.8 ± 4.4	13.9 ± 4.4	19.3 ± 1.3	19.0 ± 3.6
05	Forehead, middle left, middle	22.0 ± 6.1	12.7 ± 2.6	25.2 ± 4.5	19.7 ± 1.5
06	Forehead, middle left, lower	20.7 ± 5.9	10.0 ± 2.3	19.5 ± 1.9	13.3 ± 1.5
07	Forehead, middle right, upper	15.6 ± 3.8	n.a.	n.a.	n.a.
08	Forehead, middle right, middle	16.3 ± 5.0	10.5 ± 3.4	17.0 ± 3.2	15.4 ± 2.1
09	Forehead, middle right, lower	13.8 ± 1.5	8.5 ± 1.7	n.a.	12.7 ± 0.8
10	Forehead, outer, level with eyebrow	13.7 ± 1.0	8.8 ± 2.2	15.2 ± 3.0	10.7 ± 1.3
Eye region					
11	Eye	17.2 ± 2.6	7.9 ± 1.8	11.6 ± 2.3	9.2 ± 1.5
12	Eye lid	21.2 ± 5.6	13.7 ± 1.7	24.2 ± 4.5	20.3 ± 2.3
13	Under eye, inner corner	24.7 ± 6.1	14.6 ± 1.8	24.2 ± 5.2	23.8 ± 3.3
14	Under eye, middle	22.5 ± 4.6	17.1 ± 3.0	26.6 ± 6.9	19.0 ± 1.8
15	Under eye, outer corner	14.5 ± 4.0	13.7 ± 3.0	26.7 ± 4.4	21.6 ± 3.1
Cheek region					
16	Cheek, lateral	18.0 ± 6.4	9.2 ± 1.7	19.3 ± 6.8	16.9 ± 3.3
17	Cheek, middle, oblique	15.5 ± 3.4	8.5 ± 2.0	17.3 ± 2.2	12.1 ± 1.1
18	Cheek, middle, lateral	14.3 ± 1.9	8.6 ± 2.1	16.2 ± 2.7	10.8 ± 1.9
19	Cheek, lower, oblique	28.9 ± 8.3	29.4 ± 7.9	26.1 ± 4.7	31.5 ± 3.4
20	Cheek, lower, lateral	23.5 ± 6.8	10.8 ± 2.4	23.7 ± 3.9	18.1 ± 0.8
21	Cheek, lower, oblique	19.2 ± 6.0	9.7 ± 2.4	19.0 ± 1.8	13.1 ± 0.4
22	Cheek, lower, lateral	18.8 ± 4.5	17.8 ± 2.8	25.7 ± 2.0	28.8 ± 5.2
23	Cheek, lower, oblique	15.7 ± 3.1	9.8 ± 3.1	18.6 ± 3.6	13.4 ± 2.2
24	Cheek, lower, lateral	11.0 ± 1.9	6.5 ± 1.9	15.8 ± 2.7	10.4 ± 1.4
Jaw region					
25	Chin, central	16.8 ± 3.4	8.3 ± 1.8	19.1 ± 3.0	15.9 ± 1.9
26	Chin, lateral	12.9 ± 3.3	6.7 ± 1.6	13.7 ± 2.5	9.7 ± 1.1
27	Jaw, anterior oblique	21.4 ± 2.9	14.3 ± 3.6	25.3 ± 3.7	26.0 ± 3.1
28	Jaw, oblique	22.3 ± 6.1	9.4 ± 2.3	20.3 ± 4.4	20.3 ± 1.8
29	Jaw, oblique/lateral	13.3 ± 1.9	6.7 ± 1.5	16.1 ± 2.7	14.2 ± 2.7
30	Jaw, lateral	11.0 ± 2.6	5.3 ± 1.2	16.1 ± 2.8	9.5 ± 1.0
Various					
11	Nose, bridge	17.7 ± 3.7	15.7 ± 4.6	25.8 ± 3.0	24.6 ± 2.9
16	Nose, apex	14.3 ± 1.9	8.6 ± 2.1	16.2 ± 2.7	10.8 ± 1.9
17	Nasolabial sulcus, top	20.4 ± 4.7	27.3 ± 7.8	31.9 ± 4.9	20.7 ± 1.8
21	Philtrum	11.8 ± 2.1	7.5 ± 1.4	14.4 ± 1.8	8.8 ± 1.1
22	Nasolabial sulcus, midpoint	36.3 ± 6.0	29.3 ± 5.5	23.3 ± 1.1	26.4 ± 4.0

CORNEOMETER or SCICON readings



Facial Color Hydration Mapping



dsm-firmenich R. Voegeli et al; International Journal of Cosmetic Science, 2015, 37, 595-605

Facial Color Hydration Mapping shows the need of a moisturizer for problem areas

- Facial hydration is much more complex than generally described
- Remarkable differences exist within short distances and between different ethnic groups
- Very dry skin around the nasolabial fold area in all four ethnic groups.

Skin hydration color maps of four ethnic groups (Chinese, Caucasian, Indian, African) living in the highly-polluted city of Pretoria**, South Africa



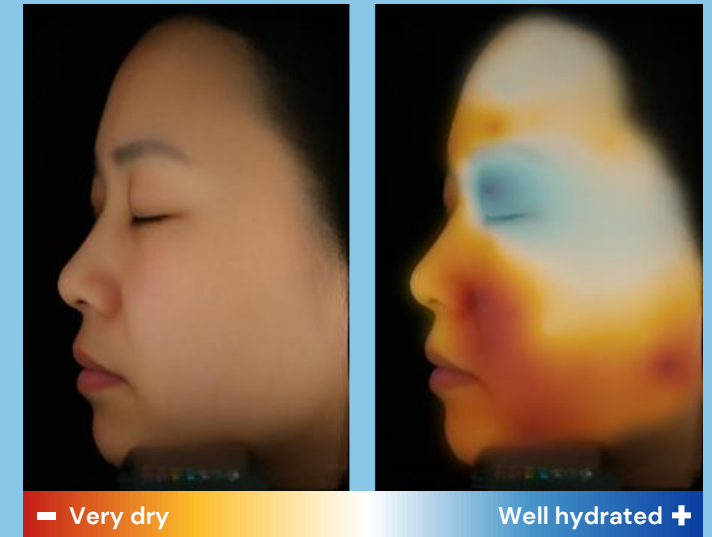
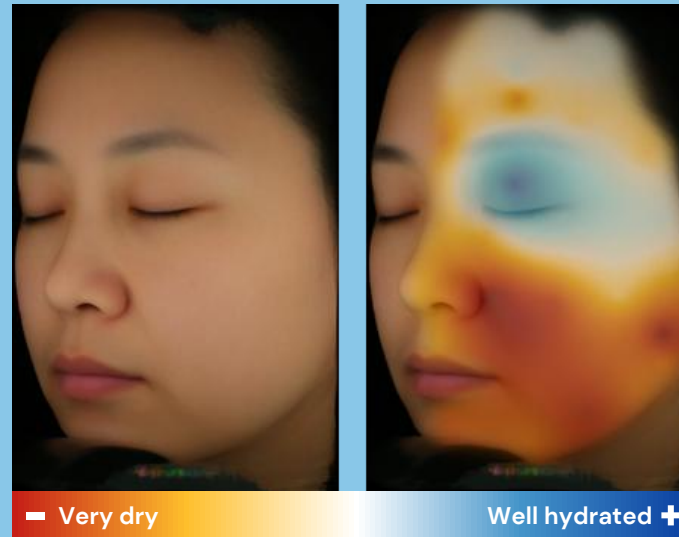
dsm-firmenich Voegeli et al. 2019 review article in IJCS; 41, 411 – 424

Facial Color Mapping Hydration Study

Beijing/China

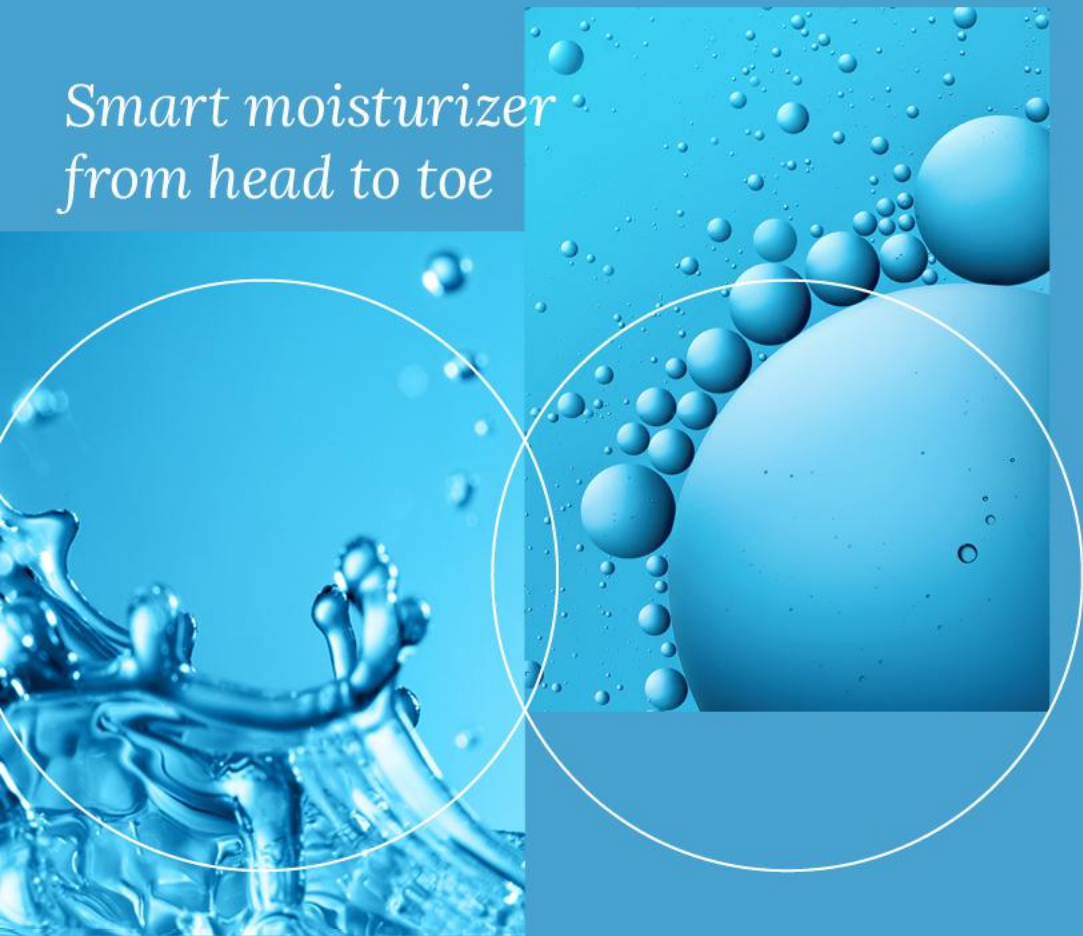
Our discovery

Chinese women have excessively dry skin particularly in the lower part of the face



PENTAVITIN®

*Smart moisturizer
from head to toe*



1970s

Sugar isomerization technology

Start to evaluate sugar isomerisation technology for the Beauty industry

Patented/Padberg et al

Influence of the bonding of sugars to keratin on the water retention of the stratum corneum

1982

PENTAVITIN® Launch

2012

72-hour long-lasting deep hydration

BSB Award for the Most Innovative Raw Material in the Natural Products Category



2012

Soothing & anti-irritation

China Personal Care & Cosmetics Innovation Award



2015

Novel facial color mapping technology makes PENTAVITIN® benefits visible



2017

Fully sustainable

One of the lowest carbon footprints in the industry for a moisturizing ingredient



2019-2022

New discoveries for body and scalp care



2024

Helps to repair sun damaged skin



PENTAVITIN®

ID card

INCI NAME:	Saccharide Isomerate, Aqua, Citric Acid, Sodium Citrate,		
TECHNOLOGY:	Skin identical sugar complex, produced sustainably using sophisticated sugar technology 100% of natural origin Edible maize kernels derived		
TECHNICAL:	Form: Liquid pH of use: 3 – 10	Use level: 0.2 – 5% Preservative: Free	Solubility: Soluble in water at all ratios and in alcohol Biodegradable: Expected to be biodegradable
BENEFITS:	● It binds to keratin and gives back vitality to your skin (vital keratin), meaning hydration continues long after application (moisture magnet)* ● Unlike Glycerin and Hyaluronic Acid, it can't be washed away, meaning it keeps working even if you miss a day* ● Boosts your skin's natural moisturizers for supple, dewy-fresh skin* ● Hydration is instant and lasts for up to 72 hours** ● This versatile active helps to soothe the skin, but also enhances its barrier and repairs sun-damaged skin* ● Relieves itchy, flaky, sensitive skin, helping it to feel soft and smooth**		
REGISTRATION CERTIFICATION	 Raw material verified by ECOCERT GREENLIFE, conform to the COSMOS Standard 		

PENTAVITIN®

INCI name: Saccharide Isomerate, Aqua, Citric Acid, Sodium Citrate
Product codes: 5038443

One of the lowest carbon footprints in the industry for a moisturizing ingredient
Long proven track record on skin health benefits

Calculation methods:

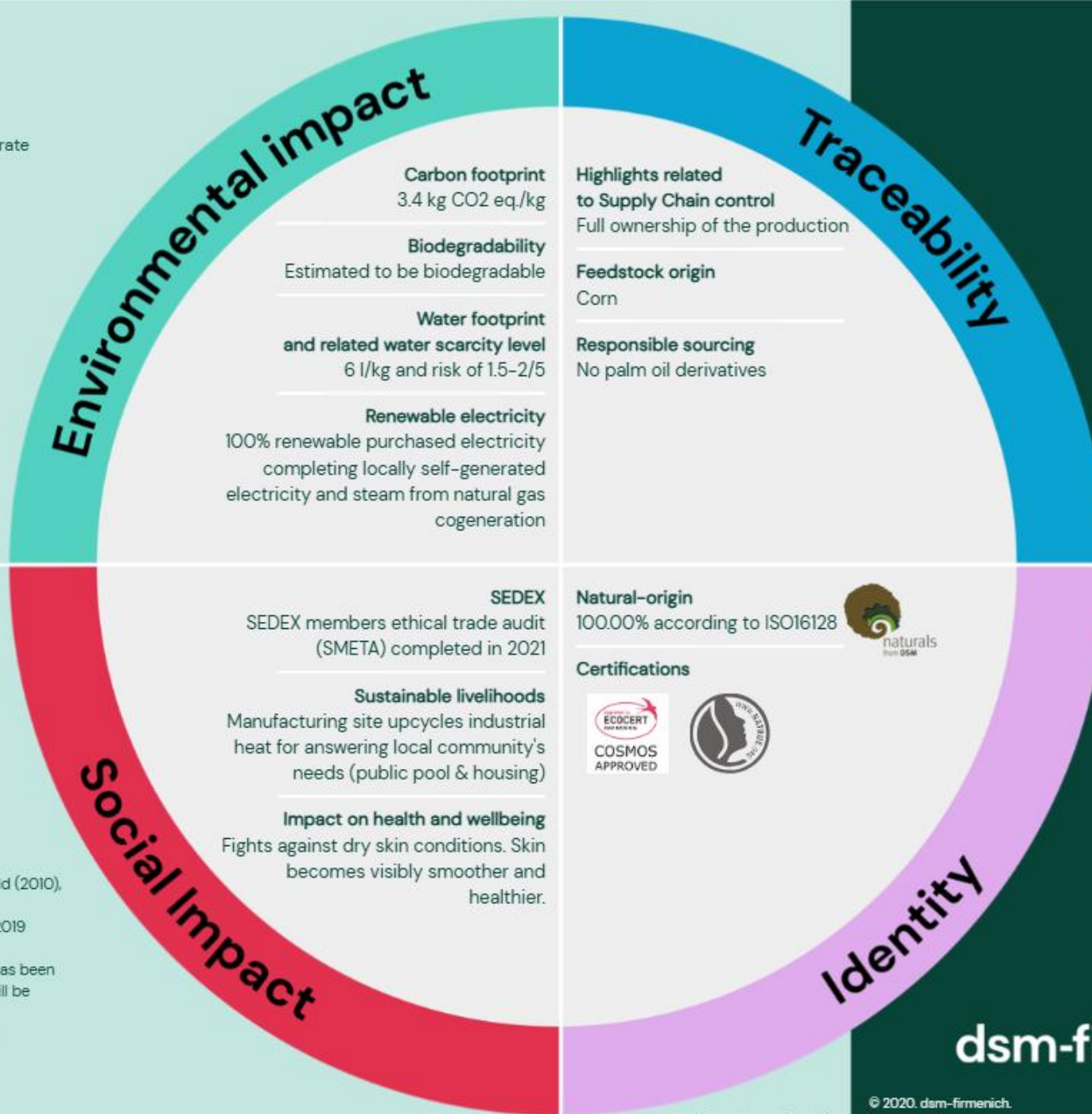
Water footprint: calculated by ReCiPe 2016 Midpoint (H) V1.03 / World (2010), aligned with WBCSD guidelines

Water scarcity level: WRI (world resources institute) Aqueduct tool 2019

Calculation based on production data from Aesch. The production has been transferred to Grenzach and data will be updated as soon as they will be representative.

The carbon and water footprint calculations are based on internally conducted LCA according to ISO 14040/44 guidelines, dsm-firmenich LCA policy and validated by an internal reviewer.

The biodegradability is based on relevant OECD tests.



Aligned with and contributing to the
SUSTAINABLE DEVELOPMENT GOALS



dsm-firmenich 

Card version 2

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PENTAVITIN®

Easy to use



Soluble in water at all ratios



Stable in formulation containing alcohol



Can be added during the manufacturing process **at any time (< 60°C)** to the aqueous phase of a formulation



It is recommended to add it below **40°C** to avoid unnecessary heating of the active and to use amine-free formulation



Recommended dosage **0.2 – 5%**



Patented for boosting foam performance

Method

- Foam generation and decay were measured with the SITA Foam Tester R-2000 under fully automated, standardized conditions.
- Key test parameters
 - 5 g/L in tap water
 - Sample volume: 250 mL at 25 °C
 - Stirring: 60 × 10 s at 1500 rpm
 - Foam decay: 10 s intervals, max. 10 min

Granted patents for improving foaming properties

- China: CN115298296B (0.1–5% PENTAVITIN®)
- US: US12496261B2 (0.01–10% PENTAVITIN®)

Pending patents

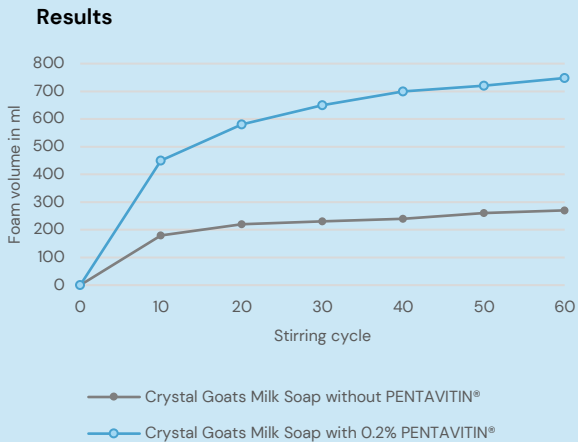
- Europe, Korea, Japan

Superior foam volume with 0.2% PENTAVITIN® in a soap bar



PENTAVITIN® enhances foam volume across cleansing formats

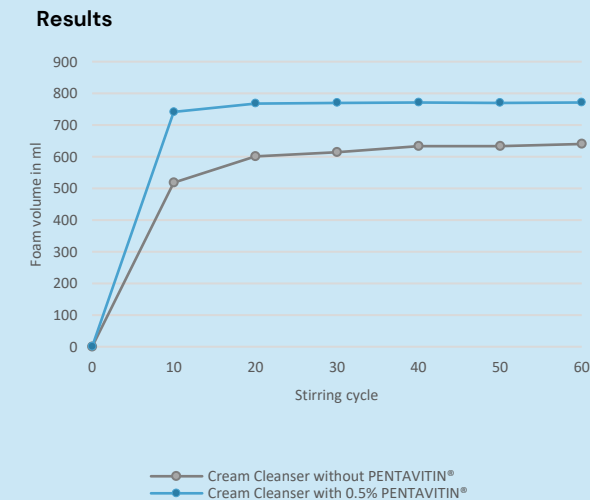
Crystal Goats Milk Soap with 0.2% PENTAVITIN® shows higher foam volume compared to the same formula without PENTAVITIN®.



Crystal Goats Milk Soap 0.2% PENTAVITIN®

Ingredients	% w / w
aqua, glycerin, sodium stearate, sorbitol, sodium laurate, goat milk, propylene glycol, sodium laureth sulfate, sodium chloride, sodium lauryl sulfate, titanium dioxide, stearic acid, lauric acid, pentasodium pentetate, tetrasodium etidronate	99.8
PENTAVITIN®	0.2%

Cream Cleanser with 0.5% PENTAVITIN® demonstrates enhanced foam generation compared to the same formula without PENTAVITIN®.

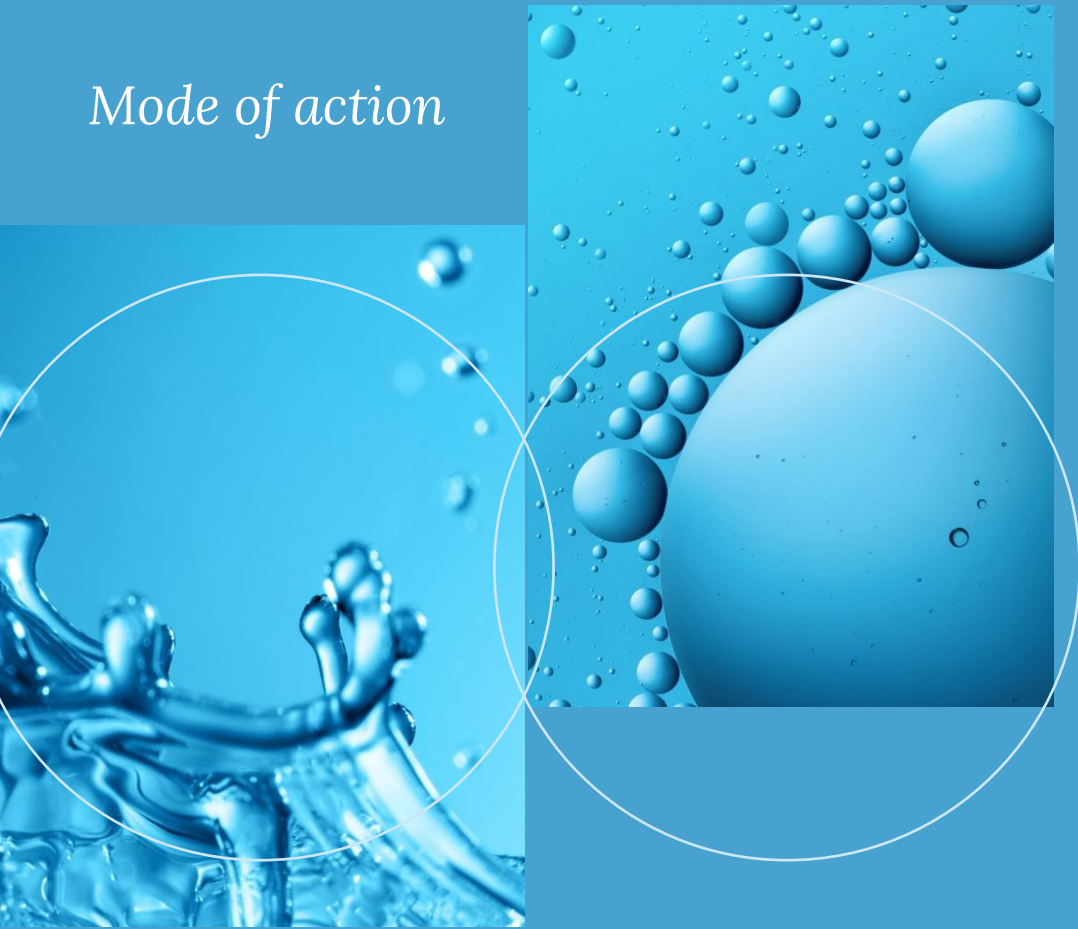


Cream cleanser with 0.5% PENTAVITIN®

Ingredients	% w / w
Aqua	23.78
Disodium EDTA	0.05
Glycerin	25.00
Myristic acid	25.00
Stearic acid	5.50
Glyceryl Stearate, PEG-100 Stearate	3.00
PEG-150	5.00
Potassium Hydroxide	5.17
Polyquaternium-7	2.00
Cocamidopropyl Betaine	3.00
Olive Oil PEG-8 Esters	2.00
PENTAVITIN	0.50

PENTAVITIN®

Mode of action



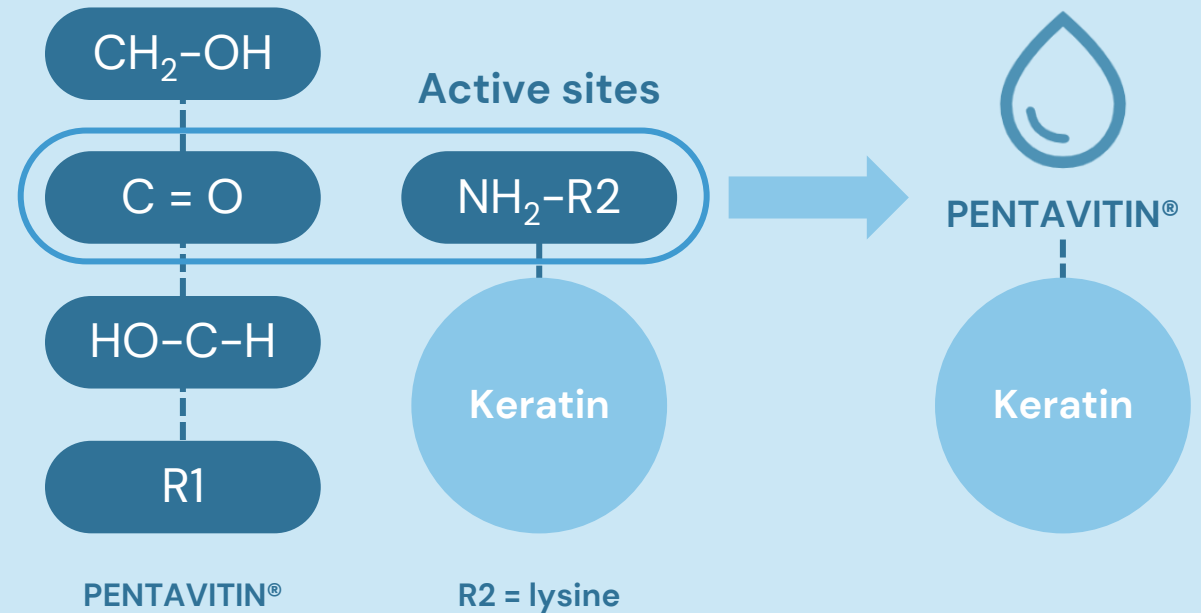
Binding hydration

- Binds to keratin and gives back vitality to your skin like a Moisture Magnet*
- The unique binding mechanism ensures that the active is not washed away but continues to improve skin's natural hydration ability until removed naturally by desquamation.

in vitro

*Binding of PENTAVITIN® to Keratin

G. Padberg; Journal of the Society of Cosmetic Chemists; 1972



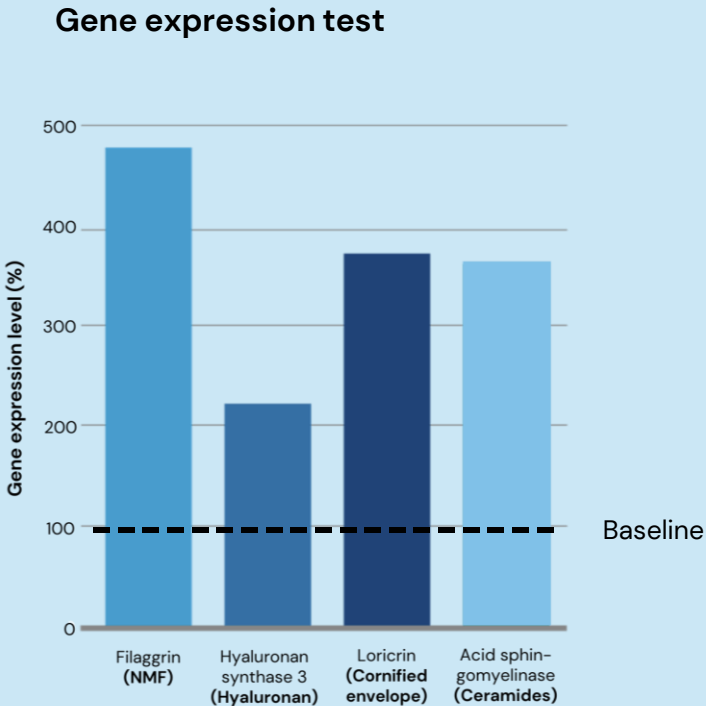
Supporting Skin Hydration and Barrier Integrity at the Gene-Expression Level

Gene expression test

- Model: Normal Human Epidermal Keratinocytes (NHEK)
- Method: Quantitative RT-PCR
- Treatment: PENTAVITIN® (0.3%) added directly to assay medium
- Replicates: Triplicates
- Outcome measured: Expression of genes involved in epidermal differentiation and skin barrier formation

- PENTAVITIN® supports key skin-barrier pathways at the gene expression level

in vitro



In-vitro gene expression studies show that PENTAVITIN® supports key skin-barrier pathways:

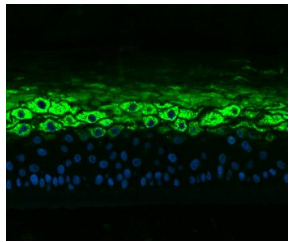
- Filaggrin: Boosts NMF formation for improved skin hydration
- HAS3: Promotes epidermal hyaluronan synthesis
- Loricrin: Reinforces the cornified envelope structure
- SMPD1: Supports ceramide synthesis for barrier lipids

Boosts Filaggrin Expression in a 3D Epidermal Skin Model under UV Stress

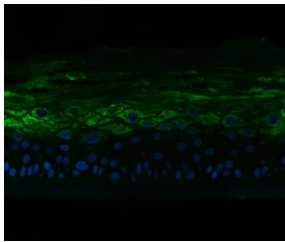
in vitro

Immunofluorescence (IF) pictures

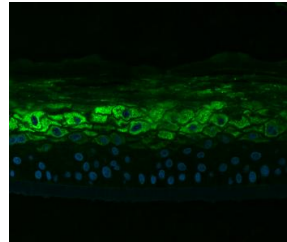
The green IF is the Filaggrin protein expression site, and the stronger the IF intensity the higher the Filaggrin content



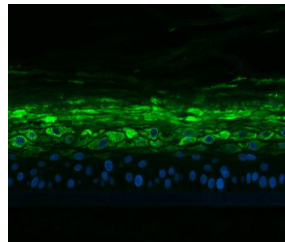
Non treated control



UVB irradiated vehicle



Positive control



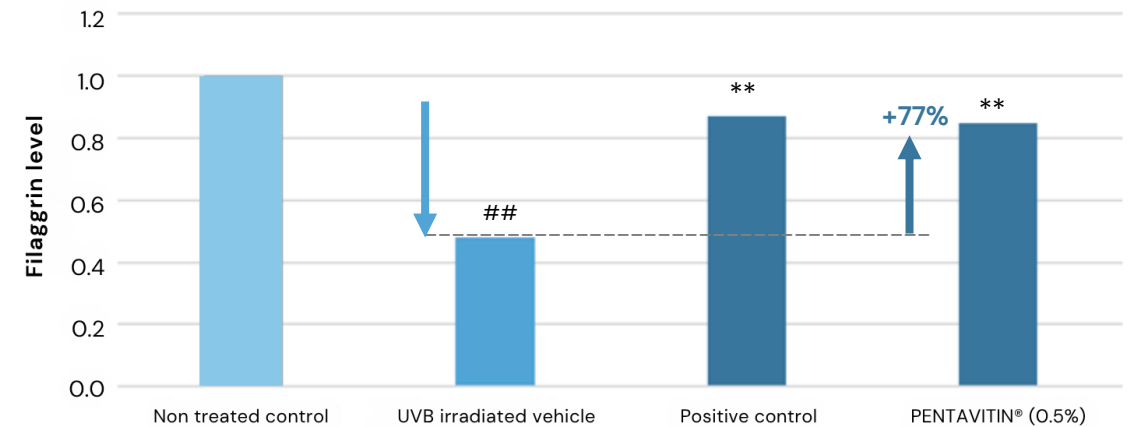
PENTAVITIN® (0.5%)

After UVB-Induced Skin Barrier Damage the Filaggrin content is decreased significantly

77% increase in Filaggrin indicating that PENTAVITIN® boost skin's natural moisturizer (NMF) and helps to repair UVB-Induced Damaged Skin

The results are significant and PENTAVITIN® is at the same level as the benchmark (positive control)

Evolution of Filaggrin in a 3D skin model irradiated with UVB



Positive control: Pirinixic acid (50 µl) is often used in biochemical assays. It reduces inflammation and triggers epidermal differentiation.

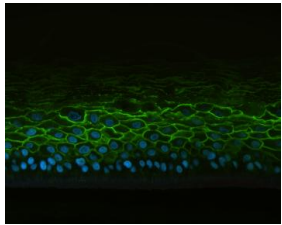
Significances are expressed by UVB irradiated vehicle vs non treated control as #, P-value < 0.05 and UVB irradiated vehicle vs UVB irradiated positive control level and UVB irradiated PENTAVITIN® as ** P-value < 0.01

Boosts Transglutaminase Expression in a 3D Skin Model under UV Stress

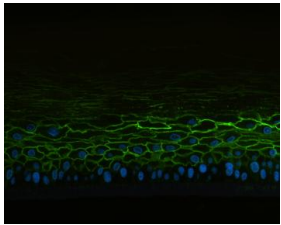
in vitro

Immunofluorescence (IF) pictures

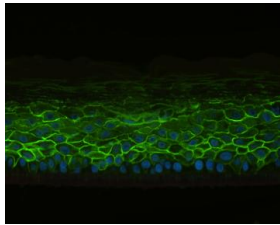
The green IF is the Transglutaminase 1 protein expression site, and the stronger the IF intensity the higher the Transglutaminase 1 content



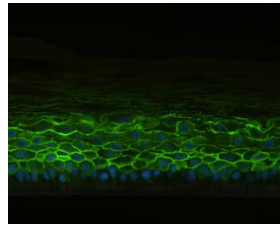
Blank Control
(without UVB)



UVB
(600mJ/cm²)



Positive control

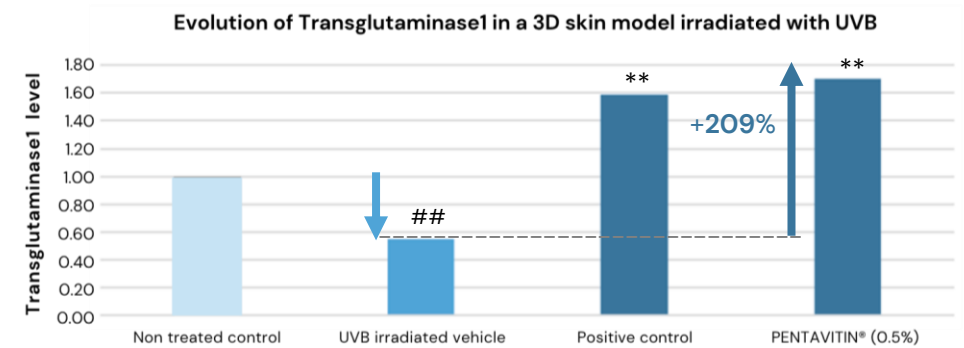


PENTAVITIN® (0.5%)

After UVB-Induced Skin Barrier Damage the Transglutaminase 1 content is decreased significantly

209% increase in Transglutaminase 1 indicating that PENTAVITIN® has a strong barrier strengthening effect

The results are significant and PENTAVITIN® is at the same level as the benchmark (positive control)

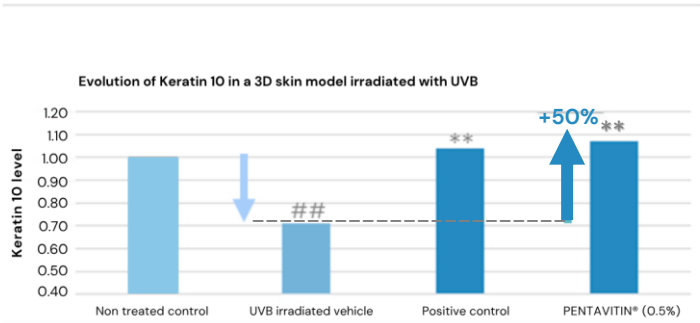
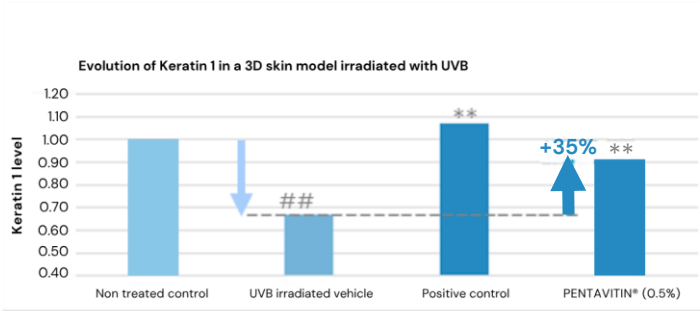


Positive control: Pirinixic acid (50 µl) is often used in biochemical assays. It reduces inflammation and triggers epidermal differentiation.

Significances are expressed by UVB irradiated vehicle vs non treated control as #, P-value < 0.05 and UVB irradiated vehicle vs UVB irradiated positive control level and UVB irradiated PENTAVITIN® as ** P-value < 0.01

Boosts Keratin 1 and 10 Expression in a 3D Skin Model under UV Stress

in vitro

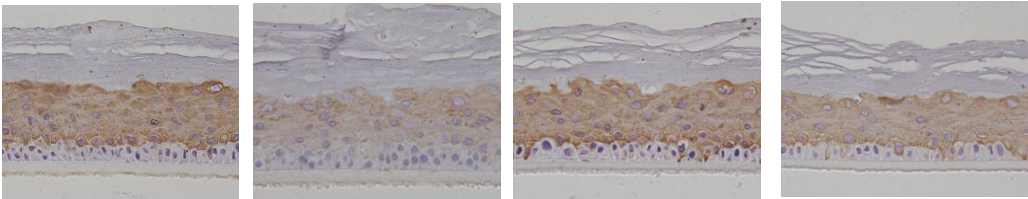


Positive control: Pirinixic acid (50 µl) is often used in biochemical assays. It reduces inflammation and triggers epidermal differentiation.

Significances are expressed by UVB irradiated vehicle vs non treated control as #, *P-value < 0.05 and UVB irradiated vehicle vs UVB irradiated positive control level and UVB irradiated PENTAVITIN® as ** P-value < 0.01

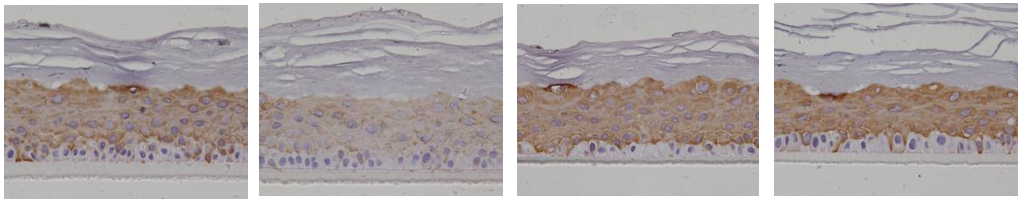
Immunohistochemistry (IHF) pictures

The brown IHC is the Keratin 1 expression site, and the stronger the IHC the higher the Keratin 1 content



Blank Control (without UVB) UVB (600mJ/cm²) Positive control PENTAVITIN® (0.5%)

The brown IHC is the Keratin 10 expression site, and the stronger the IHC the higher the Keratin 10 content



Blank Control (without UVB) UVB (600mJ/cm²) Positive control PENTAVITIN® (0.5%)

After UVB-Induced Skin Barrier Damage the Keratin 1 and 10 content are decreased significantly.

35% increase in Keratin 1 and 50% increase in Keratin 10 indicating that PENTAVITIN® has a strong skin barrier recovery and strengthening effect

The results are significant

Decreases proinflammatory cytokines IL-8 and TNFα in a 3D Skin Model under UV Stress

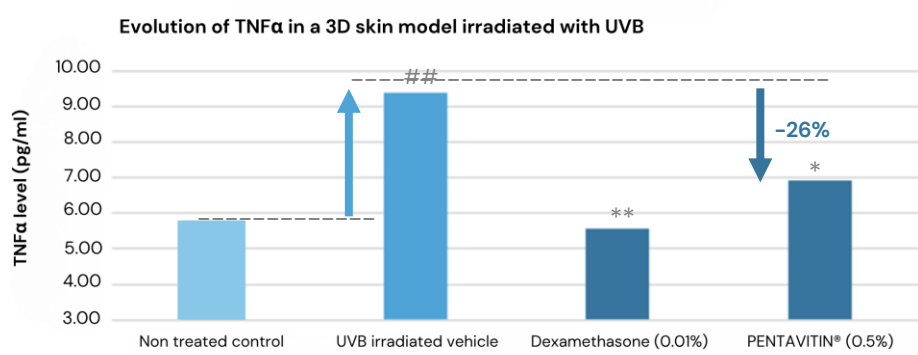
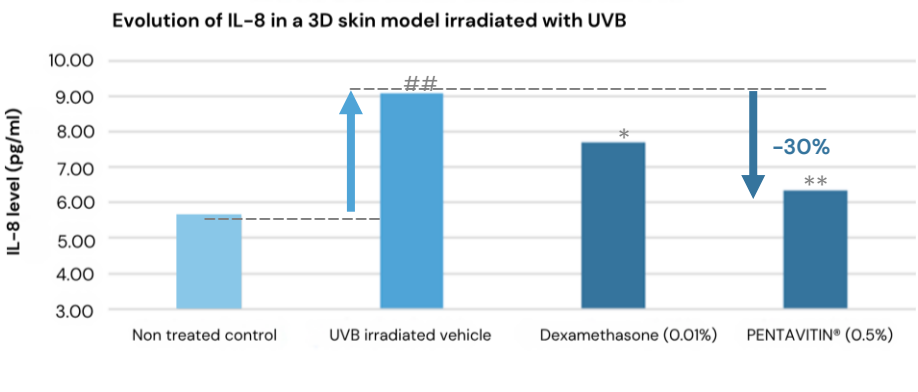
in vitro

After UV-Induced stress IL-8 and TNFα (pro-inflammatory cytokines triggered by UVB light) levels are increased significantly.

30% decrease in IL-8 and 26% decrease in TNFα indicating that PENTAVITIN® helps to soothe signs of skin redness

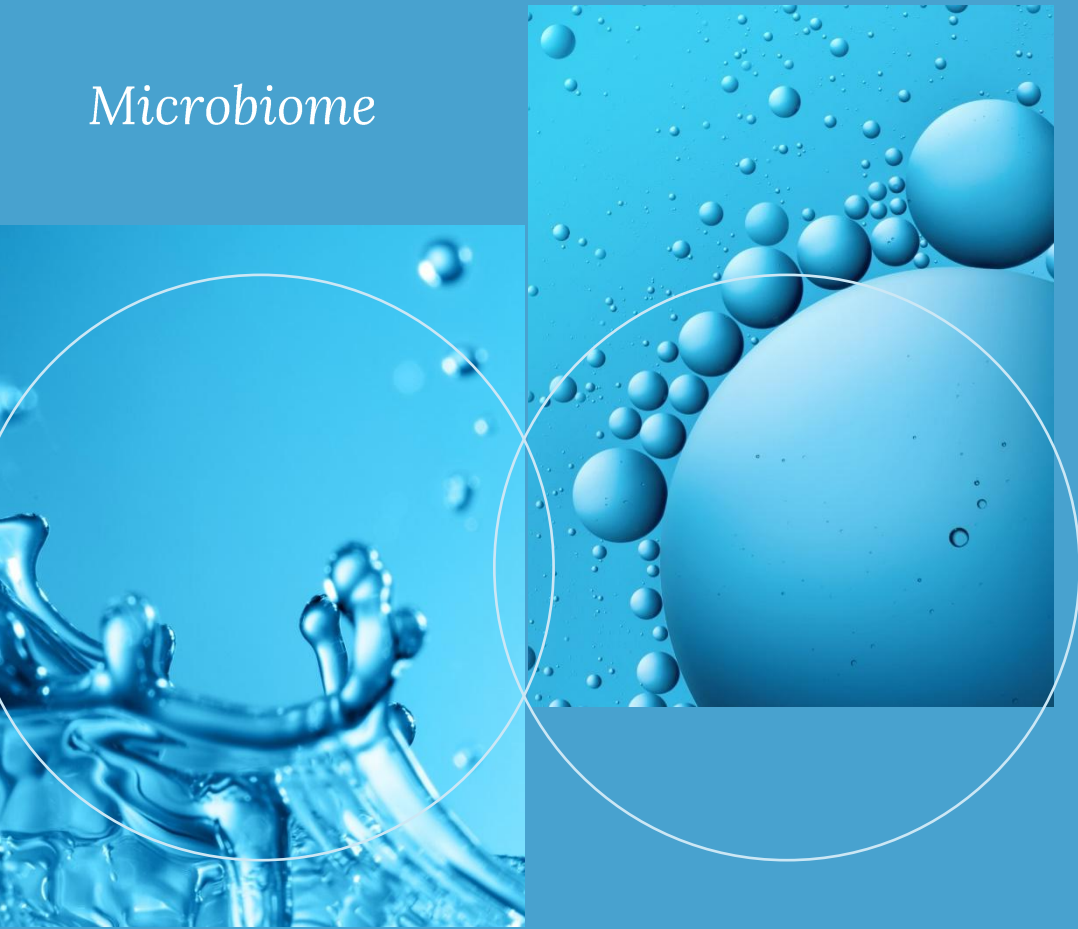
The results are significant

Significances are expressed by UVB irradiated vehicle vs non treated control as #, P-value < 0.05 and UVB irradiated vehicle vs UVB irradiated positive control (Dexamethasone 0.01%) as ** P-value < 0.01 and UVB irradiated vehicle vs UVB irradiated PENTAVITIN 0.5% as * P-value < 0.05



PENTAVITIN®

Microbiome



Microbiome friendly¹

in vitro

Tested according to MyMicrobiome Standard 18.10*



Source: www.mymicrobiome.info/mymicrobiome-standard-18-10-tests-skin-microbiome-friendly.html

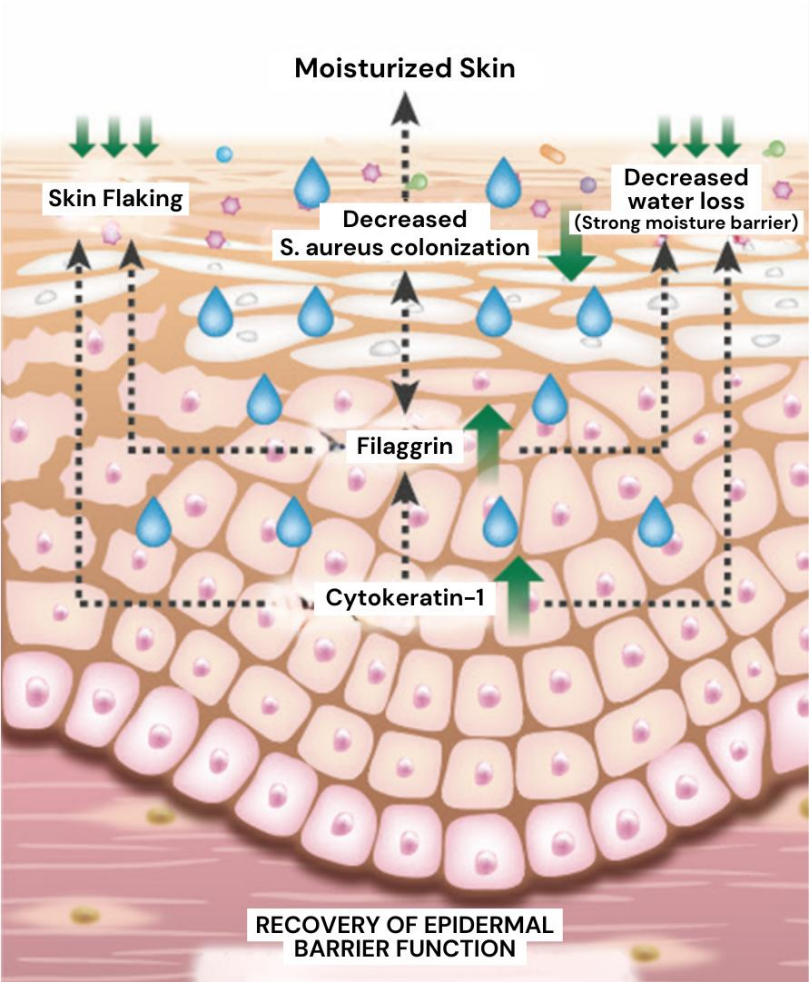
¹ Unilever patent WO2020052916A1 covers the topical use of saccharide isomerate as a prebiotic. China: patent granted, Europe: EP application remains pending



Reduces dry skin conditions in the best possible way

Tested on a St. Aureus colonized 3D skin model to mimic dry skin conditions

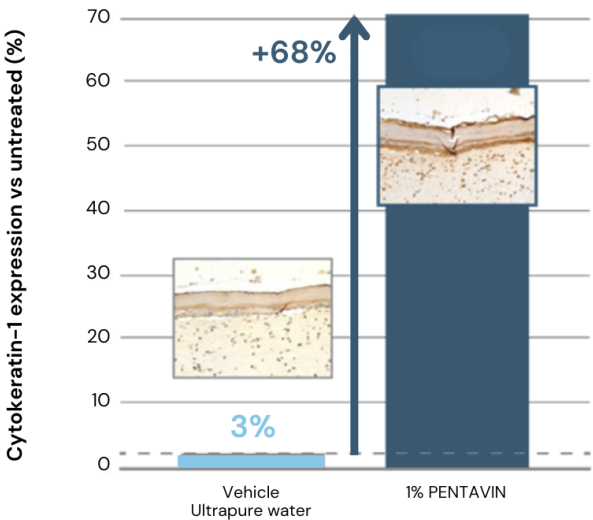
in vitro



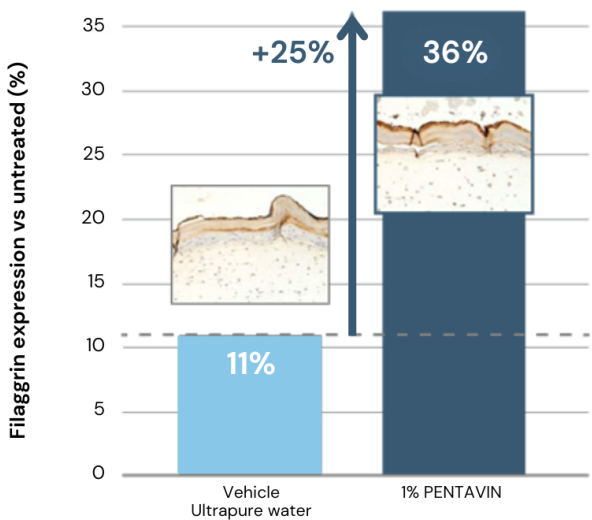
BACTERIA **PENTAVITIN®**

S. aureus

Evolution of Cytokeratin-1 in a microbiota colonized 3D skin model



Evolution of Filaggrin in a microbiota colonized 3D skin model



- Boosts Filaggrin and Keratin 1 (Cytokeratin-1) and helps to keep Staphylococcus Aureus on a low level
- Forms a strong moisture-barrier and strengthens the skin barrier
- Helps to reduce dry skin conditions

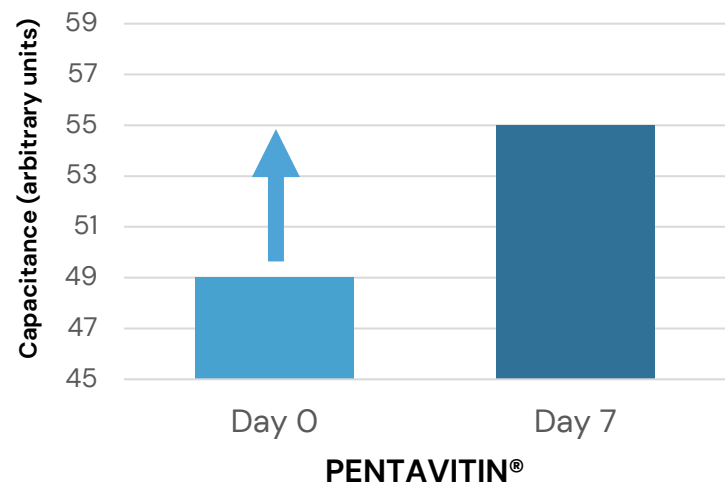
Hydrated skin and a rebalanced microbiome after 7 days

Tested in a leave-on product

in vivo

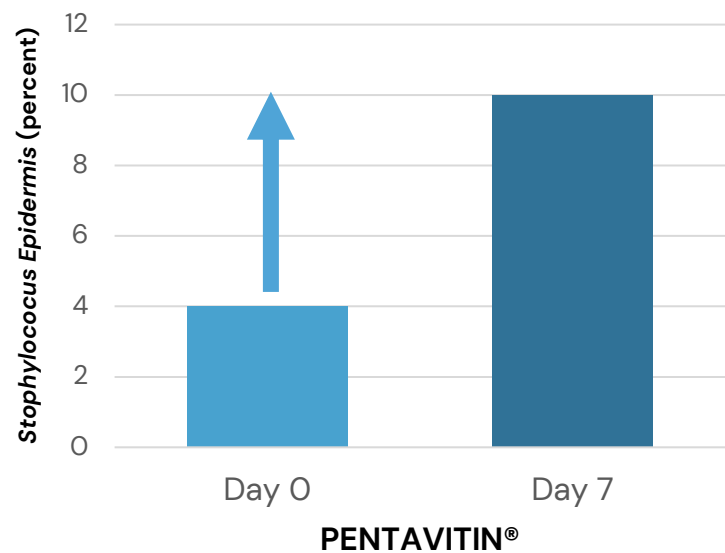
Skin hydration ↑

Evolution of the moisturization by capacitance average results on forehead/cheek



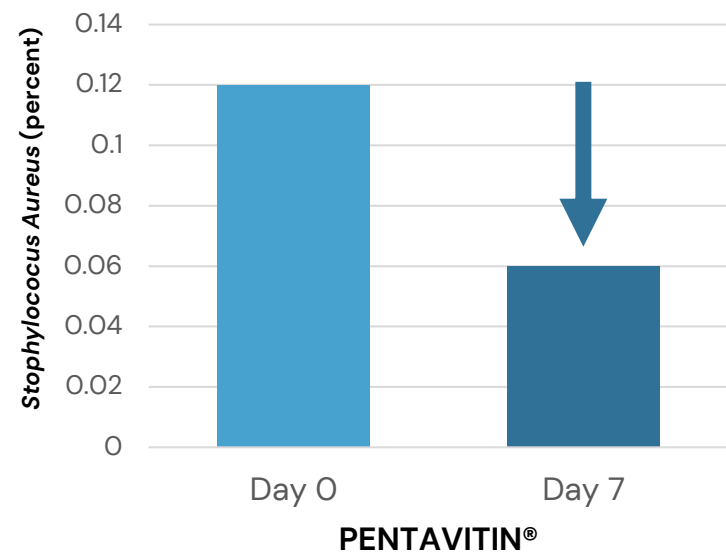
St. Epidermidis ↑

Evolution *Staphylococcus Epidermis* average results on forehead/cheek



St. Aureus level ↓

Evolution *Staphylococcus Aureus* average results on forehead/cheek



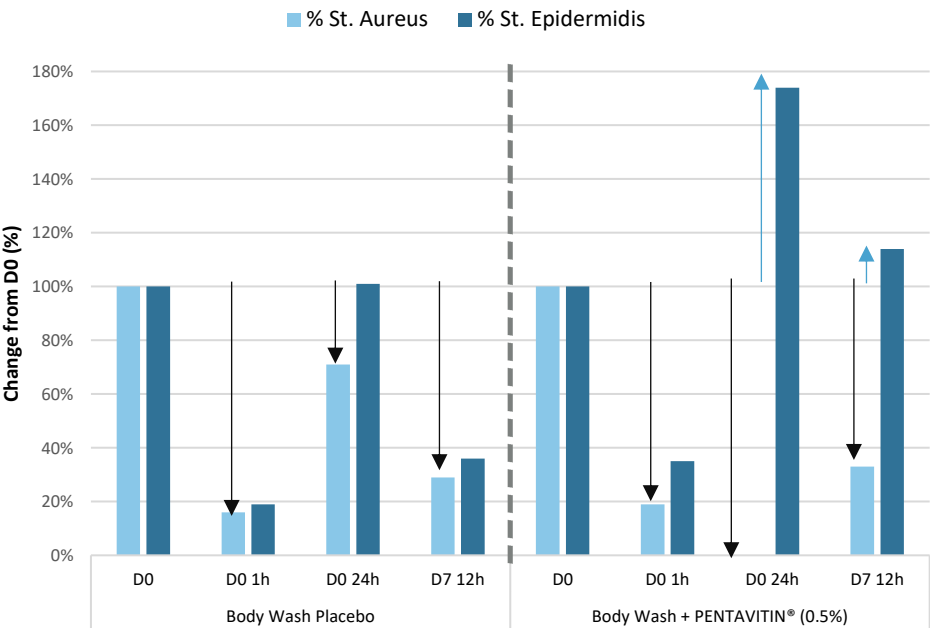
Instant barrier support and a rebalanced skin microbiome

Tested in a body wash

in vivo

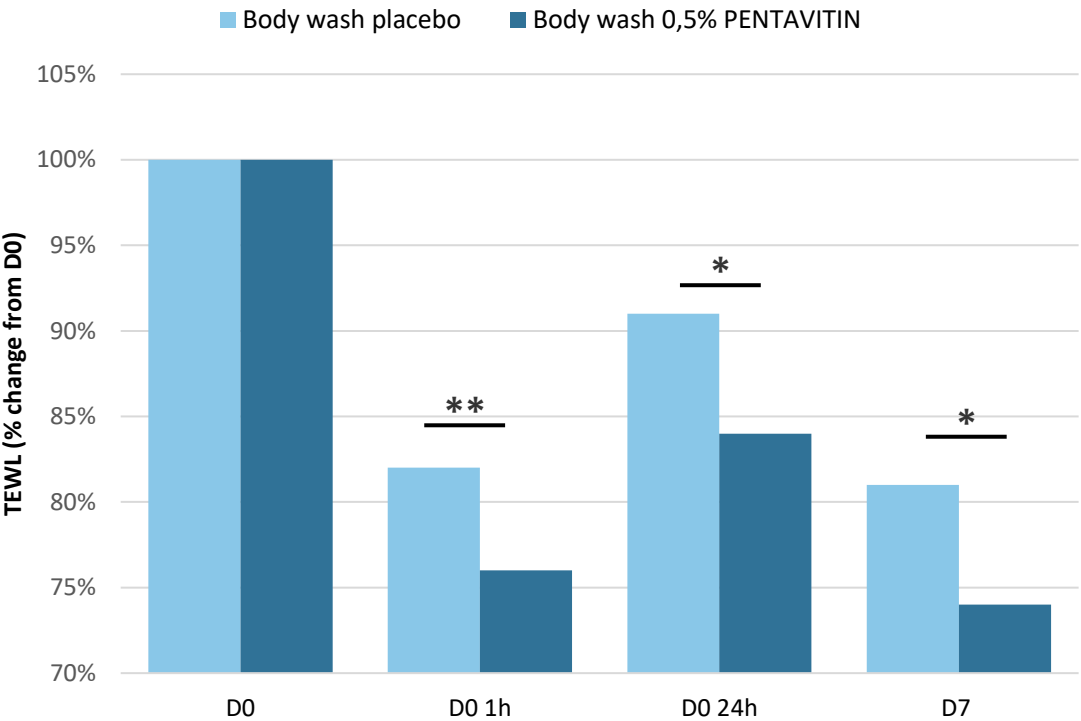
St. Epidermidis levels ↑ St. Aureus levels ↓

The body wash formulation with 0.5% PENTAVITIN® keeps Staphylococcus Aureus on a lower level and Staphylococcus Epidermidis on a higher level compared to placebo



Reinforced skin barrier

The body wash formulation with 0.5% PENTAVITIN® significantly helps to reinforce skin's barrier compared to placebo



*P ≤ 0.1 **p ≤ 0.0

PENTAVITIN®

Facial & Body Care

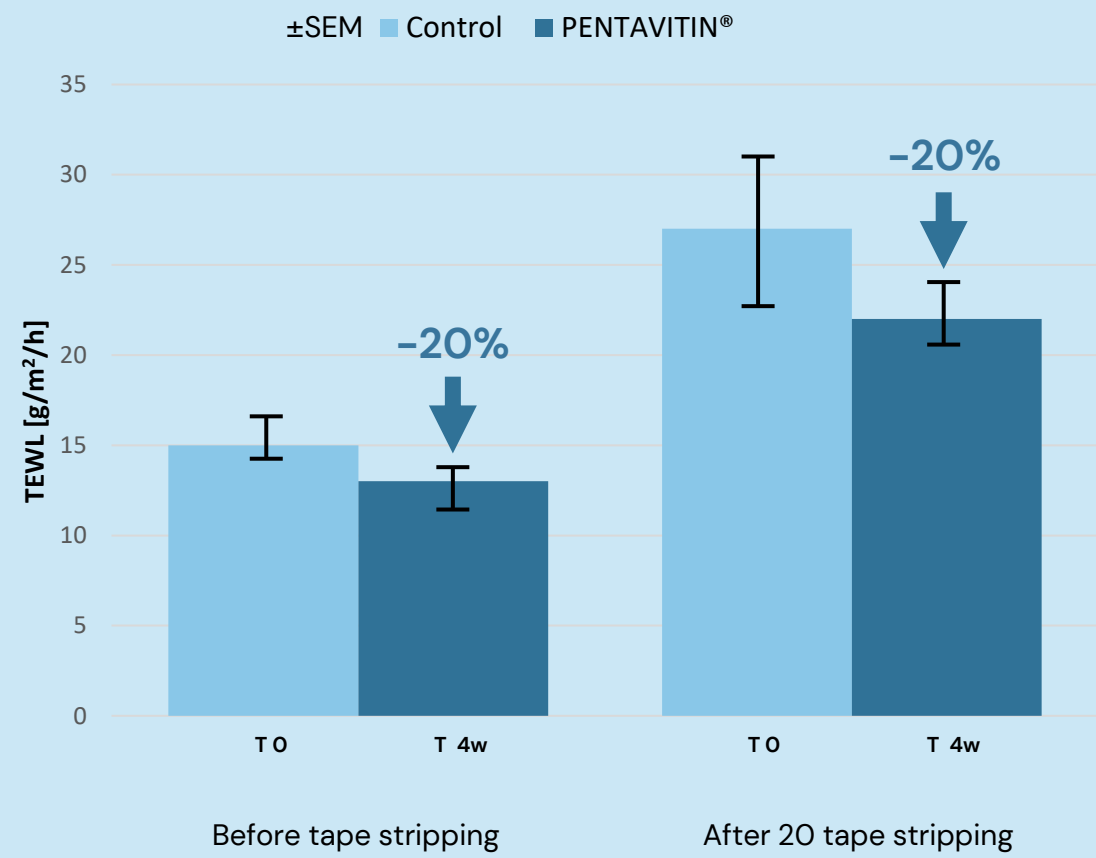


Strengthen the skin barrier function

Tested on 12 female subjects, 40±1 y, evaluated skin area: calf; twice daily application of 1% aqueous **PENTAVITIN®**, measurements before and after 4w treatment phase, barrier disruption induced by 20 tape strippings; assessment of barrier repair by TEWL

- TEWL showed a **20% reduction** following a 28 days application

in vivo



Long lasting effect, after stopping the treatment

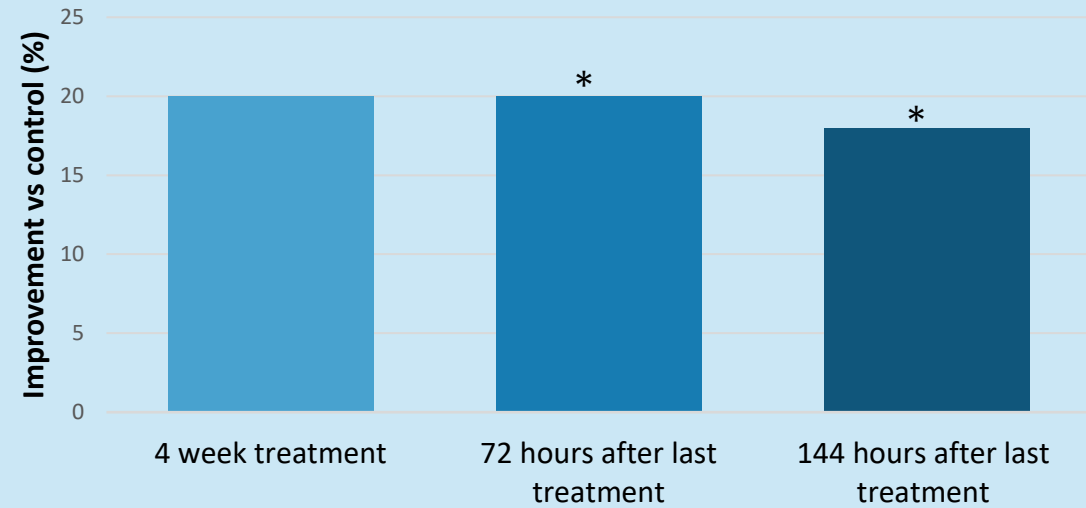
Test design

The study included 12 female subjects (40 ± 1 years) and assessed skin on the calf. Participants applied a 1% aqueous PENTAVITIN® formulation twice daily for 4 weeks. After the treatment phase, skin condition was evaluated during a regression period, with clinical assessments performed 72 h and 144 h after the last application. Skin dryness was graded using Kligman's clinical grading scale, a well-established and widely accepted method for evaluating visible signs of dryness.

- Significant hydration improvement observed 72 hours after the last application
- Hydration benefits persist for up to 144 hours (6 days) beyond the final use

in vivo

Improvement in the signs of dry skin conditions according Kligman's clinical grading



* $P \leq 0.1$ ** $p \leq 0.01$ *** $p \leq 0.001$ compared to baseline

Accelerates skin barrier recovery

Test design

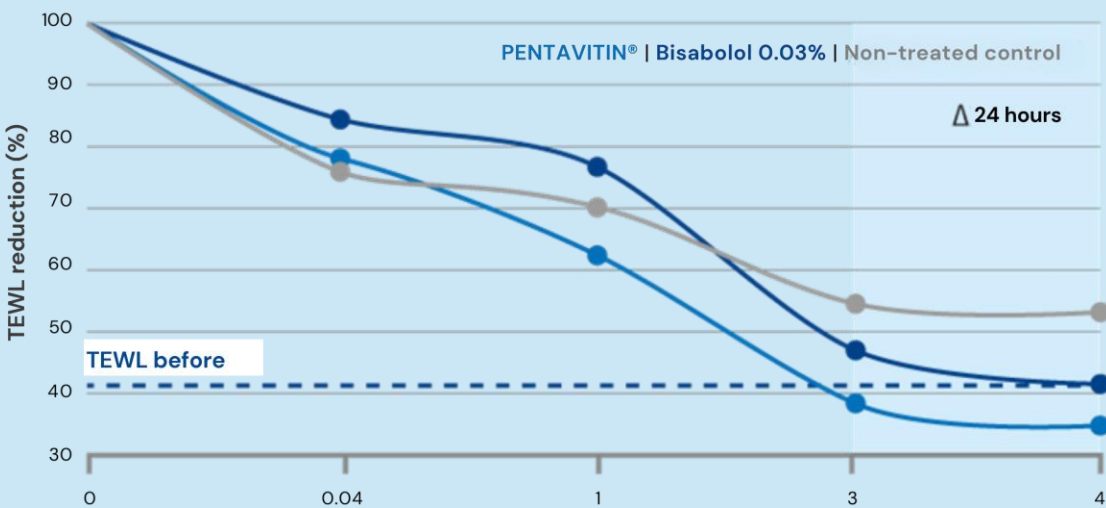
- 18 subjects, age 32–46, skin type II/III,
- 14 days treatment of 0.2% aqueous PENTAVITIN® solution and 0.03% Bisabolol under rinse-off conditions at the forearm
- Skin irritation and barrier disruption induced by tape stripping
- Assessment of barrier repair by TEWL (Tewameter TM 300®)

Results

- PENTAVITIN® **accelerates the skin’s natural barrier repair**, even under rinse-off conditions, helping the skin recover faster from daily aggressions.
- Skin barrier restored within 3 days
- Superior efficacy vs. Bisabolol (0.03%)

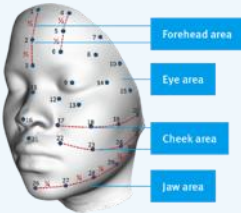
in vivo

TEWL recovery study



Full repair skin defined at TEWL levels before stripping

PENTAVITIN®: Facial Color-Mapping Study reveals targeted hydration where skin needs it most

Data collection:	April-May 2017
Study population:	• 94 Chinese women, 35.0 ± 0.9 years old • Three age and count matched groups • Subjects living in Beijing for >3 years
Type of study:	Randomized, double-blind, placebo-controlled study.
Test products:	Placebo, Vehicle with 1% PENTAVITIN®, Vehicle with 3% PENTAVITIN®.
Conditioning phase:	3 days
Application*:	Test products (0.8 – 1g) were applied twice daily (morning and evening) onto the face. 
Test site:	Left side of the face, 30 predefined sites.
Test parameter:	Continuous skin hydration level is visualized with color scales based on SKICON-200 EX* readings.
Time points:	Baseline, 3 hours, 28 days

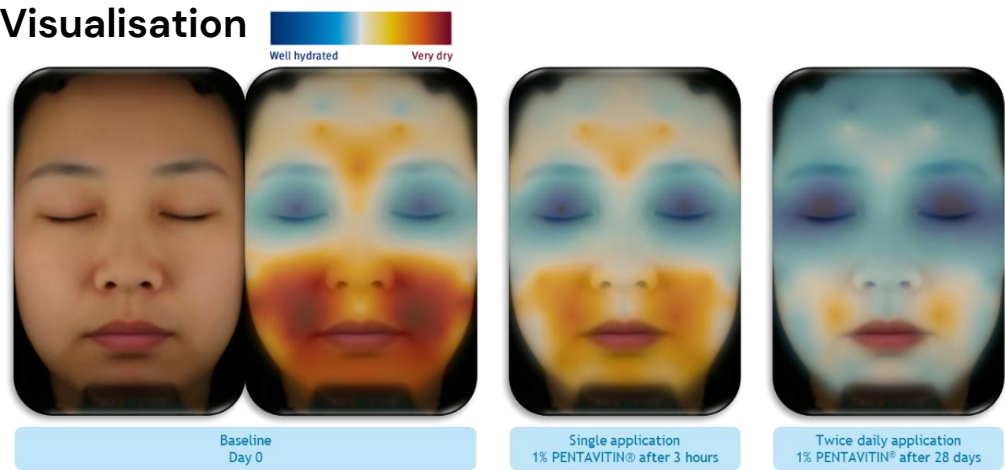


PENTAVITIN® (1%) demonstrates measurable, visible facial hydration

in vivo

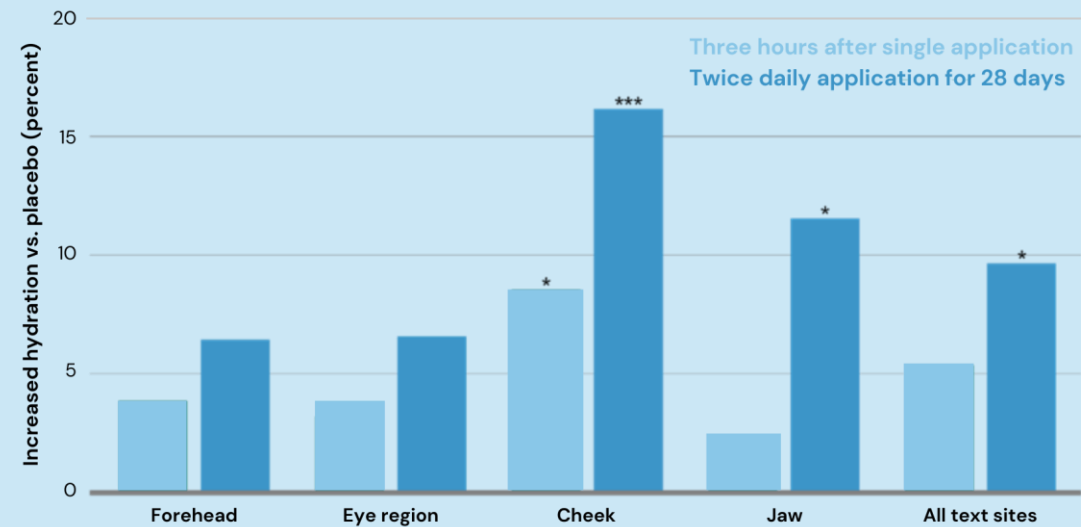
Three hours after single application of 1% PENTAVITIN® excessively dry cheek area is already significantly more hydrated.

Visualisation



After twice daily application for 28 days of 1% PENTAVITIN®, there is much better significant hydration to all facial areas.

Data analysis

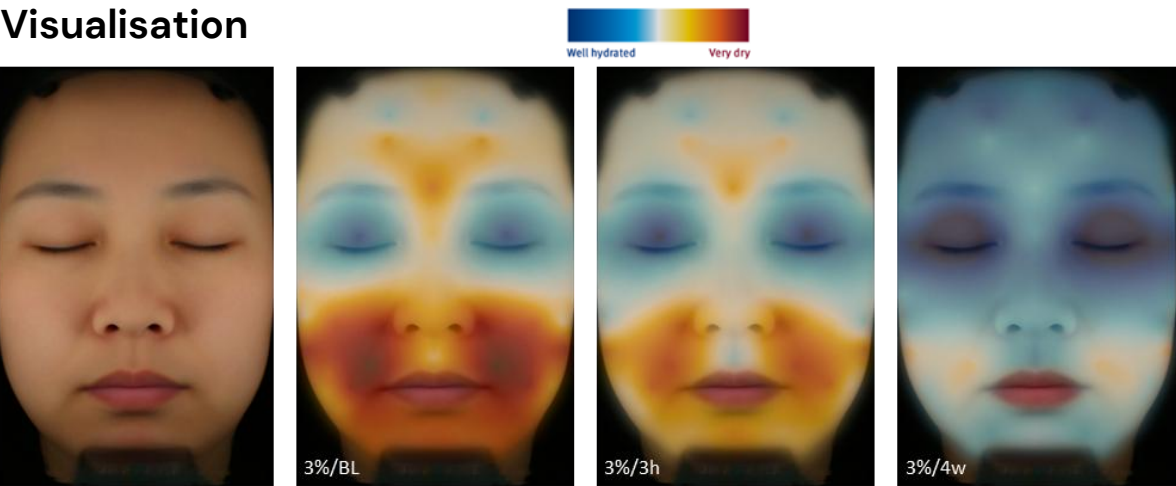


PENTAVITIN® (3%) enhances hydration performance across the entire face

in vivo

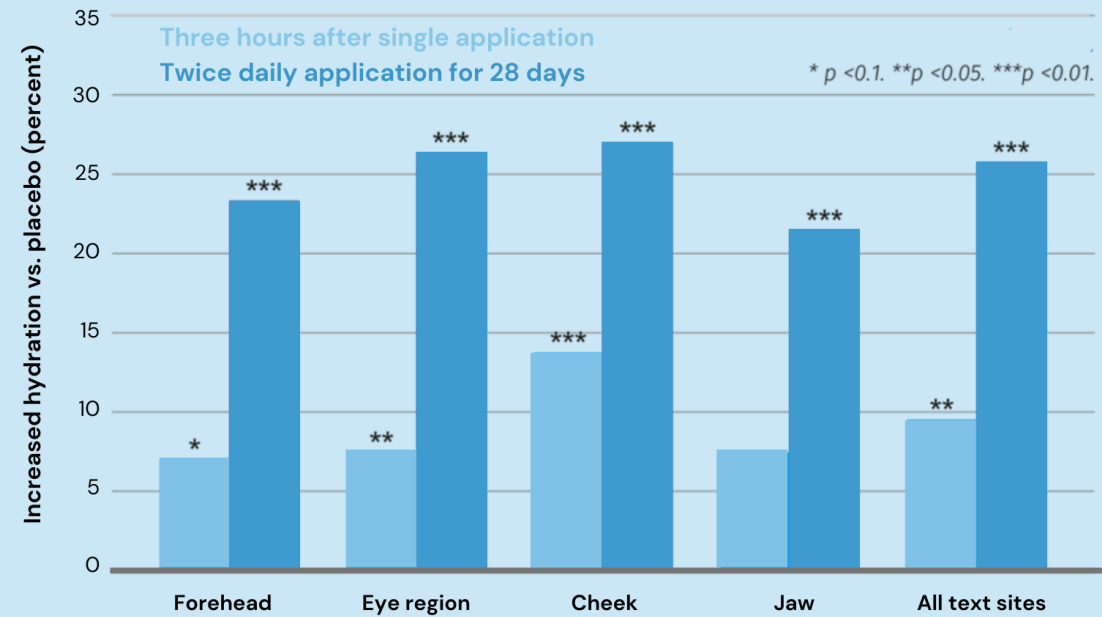
Three hours after single application of 3% PENTAVITIN® significant hydration boost of forehead, eye region and cheek area.

Visualisation



After twice daily application for 28 days of 3% PENTAVITIN®, there is highly significant hydration power to all facial areas.

Data analysis



See and feel the difference: visibly smoother, more comfortable skin

A before/after comparison on the leg showing a **visible reduction of dry skin** after 4 weeks with 1% PENTAVITIN®.



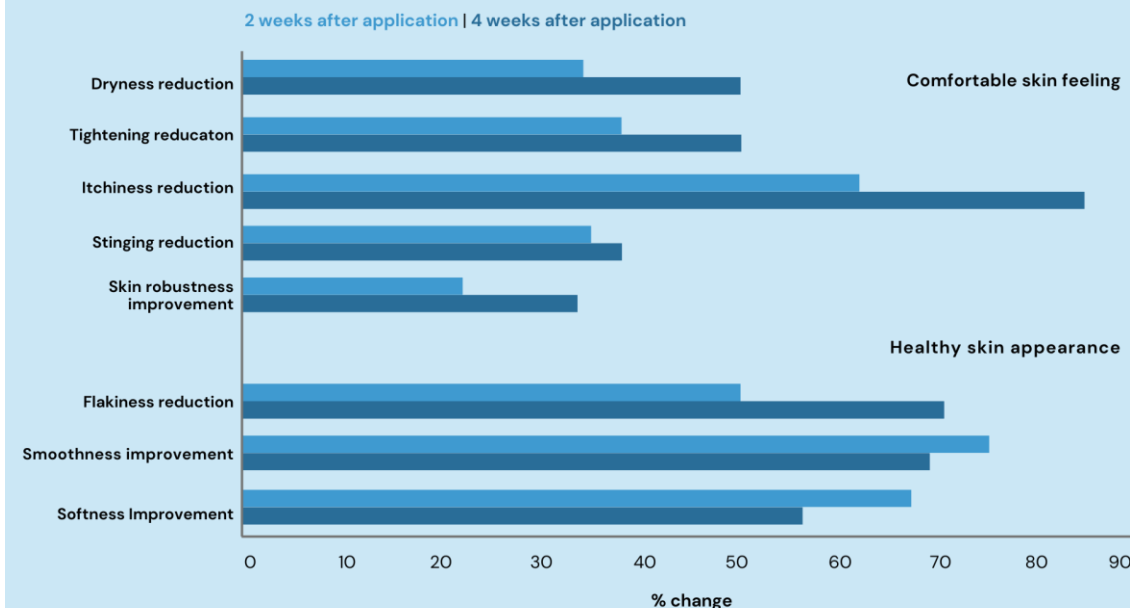
Before application
(on leg)



After 4 weeks
application of 1%
PENTAVITIN®
(on leg)

in vivo

Self-assessment results



Consumer panel (39 – 41 years old) testing confirms the benefits of PENTAVITIN® (1%)

Three key self-assessment benefits

Reduces dry skin conditions

Relieves signs of sensitivity including flaking and itching

Leaves skin soft and smooth

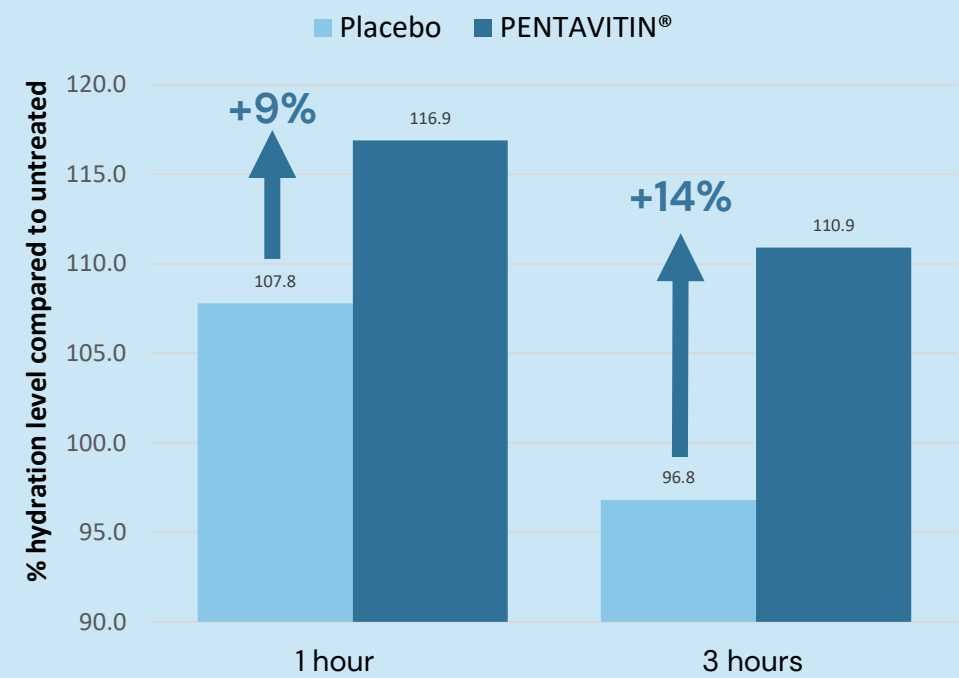
Instant hydration boost in a hand sanitizer formula

The sanitizer formulation with 1% PENTAVITIN® helps prevent the development of skin dryness and noticeably improves hydration compared to untreated skin.

- +9% hydration just 1 hour after use
- +14% hydration after 3 hours
- Significant improvement vs. sanitizer placebo

in vivo

Hydration effect in a hand sanitizer formula containing PENTAVITIN® (1%) compared to placebo sanitizer



Effective against irritation caused by Lactic acid

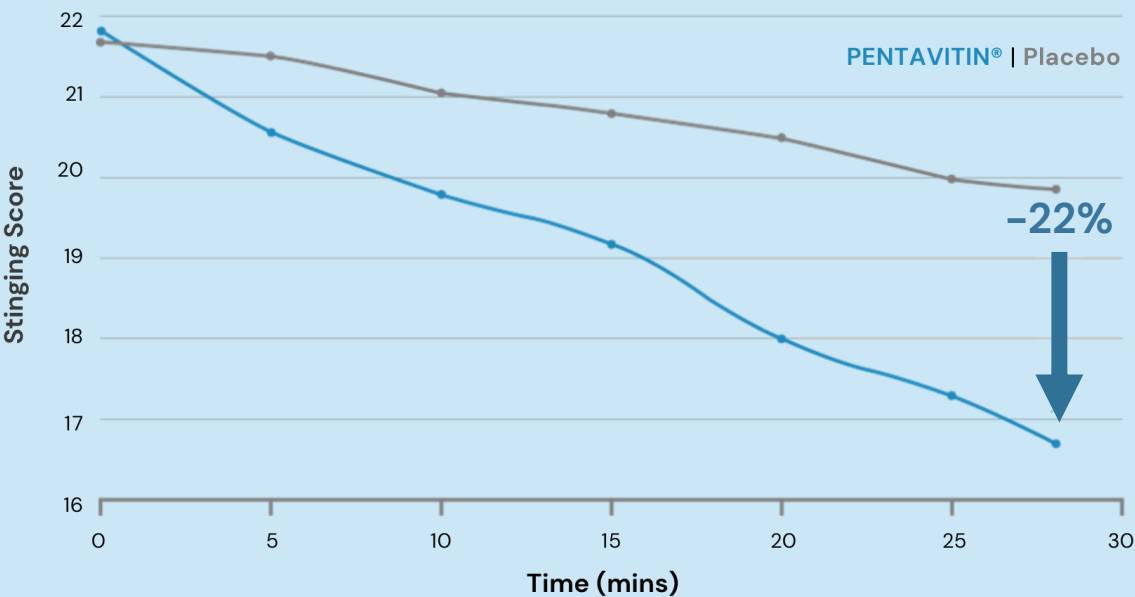
in vivo

Lactic acid stinging test

Tested on 12 female subjects, 40–60 y, evaluated skin area: face; 5% lactic acid cream/pH: 3.0 with and without 5% PENTAVITIN®, 4 weeks twice daily application, the efficacy was evaluated by trained clinician and rated on a 5-point scale (stinging score)

- Effective against irritation caused by exfoliation with Lactic acid
- 22% reduced irritation

Lactic acid stinging test



* W.Smith, SÖFW-Journal, 121;14/95

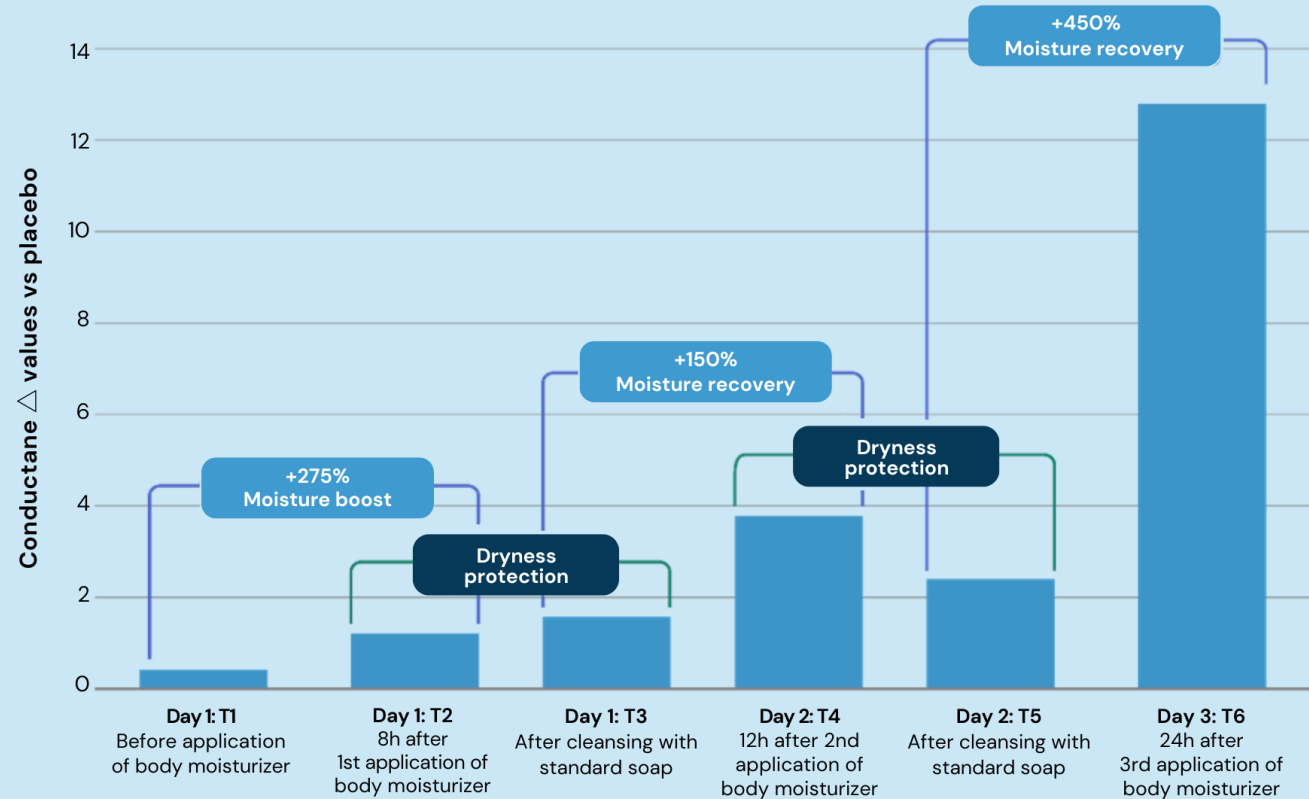
Feel good after daily showering

Tested in a body moisturizer

in vivo

Feel-good with PENTAVITIN® after daily showering

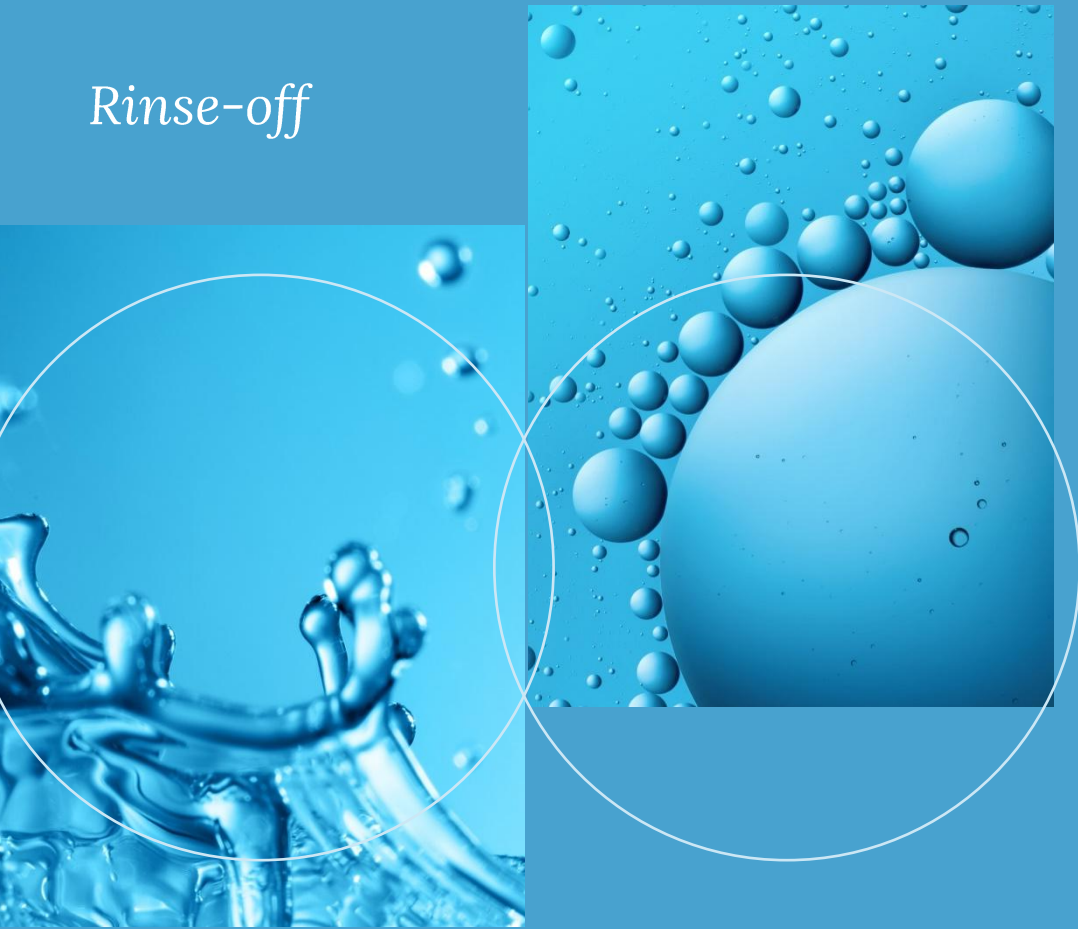
- **+ 275% more moisture after single application**
Working like a moisture-magnet, PENTAVITIN® (0.2%) in a body moisturizer boosts skin moisture compared to placebo just 8 hours after a single application (T2).
- **Helps to protect skin against dehydration**
PENTAVITIN® (0.2%) in a body moisturizer helps to protect skin against dehydration, even after daily showering (T3 and T5).
- **Strong cumulative moisture recovery effect**
Repeated use of PENTAVITIN® (0.2%) in a body moisturizer (T4 and T6) after daily showering guarantees a strong cumulative moisture recovery effect.



All data are normalized against control (untreated)

PENTAVITIN®

Rinse-off



All-Day hydration, even after frequent showers

Tested in a shower gel

24-hour hydration

PENTAVITIN® (0.2%, 0.5%) boosts skin hydration for 24 hours after one use.

Dryness prevention

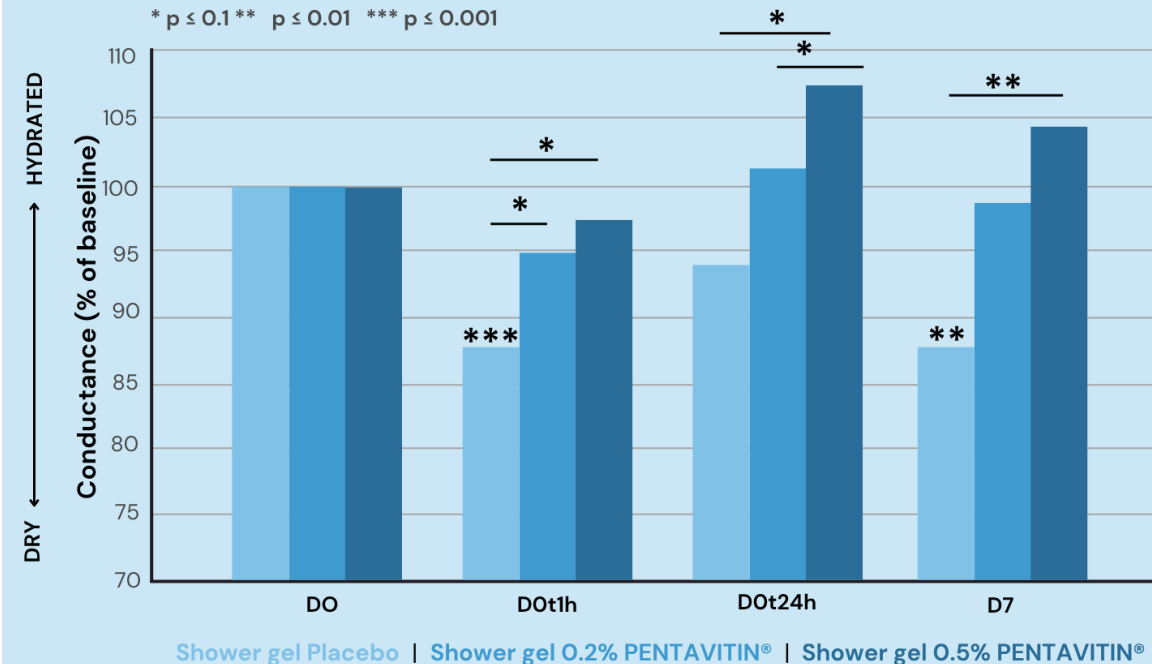
After one week of frequent showering, PENTAVITIN® formulas keep skin hydrated and help prevent dryness.

Significant effects

- Placebo causes an immediate hydration drop that does not recover after 7 days.
- PENTAVITIN® 0.5% delivers significant hydration at all time points vs. placebo.
- PENTAVITIN® 0.2% shows a significant boost after 1 hour vs. placebo.

in vivo

Evaluation of skin hydration after 7 days with shower gel (soap-free, pH 5) formulations



Helps reinforce the skin's barrier function, even post-shower

in vivo

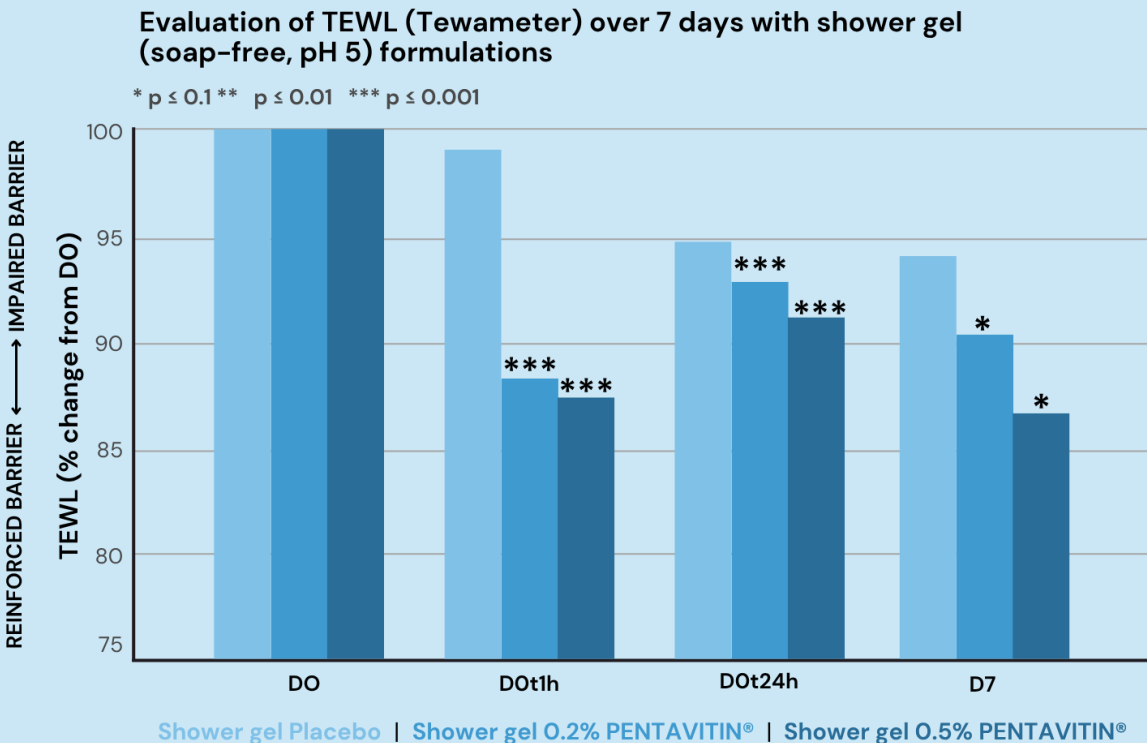
Tested in a shower gel

Reinforced skin barrier

Shower gels with PENTAVITIN® (0.2%, 0.5%) help reinforce the skin barrier just 1 hour after a single use—and continue to do so even after one week of frequent showering.

Significant effects

Shower gels with PENTAVITIN® (0.2%, 0.5%) show barrier-reinforcing benefits compared with untreated skin (DO).



Helps skin move from dry to normal in 1 hour, even with frequent showering

Tested in a body wash

Skin moves from dry to normal

Within 1 hour of showering, body-wash formulations with PENTAVITIN® (0.2%, 0.5%) help shift skin from dry to normal.

Maintained skin hydration over repeated use

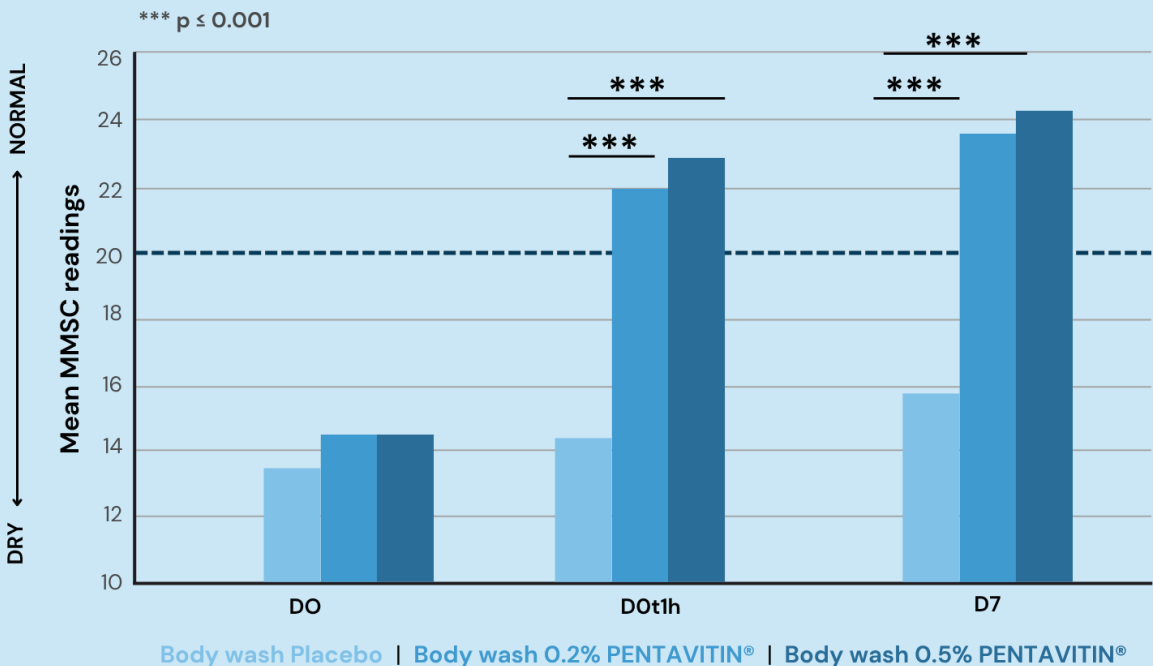
After 7 days of daily showering, formulations with PENTAVITIN® (0.2%, 0.5%) maintain elevated skin-hydration levels

Significant hydration increase

Body-wash formulations with PENTAVITIN® (0.2%, 0.5%) deliver a statistically significant improvement in skin hydration versus the placebo formulation.

in vivo

Evaluation of skin hydration (MMSC) over 7 days with body wash (soap-free, pH 9) formulations

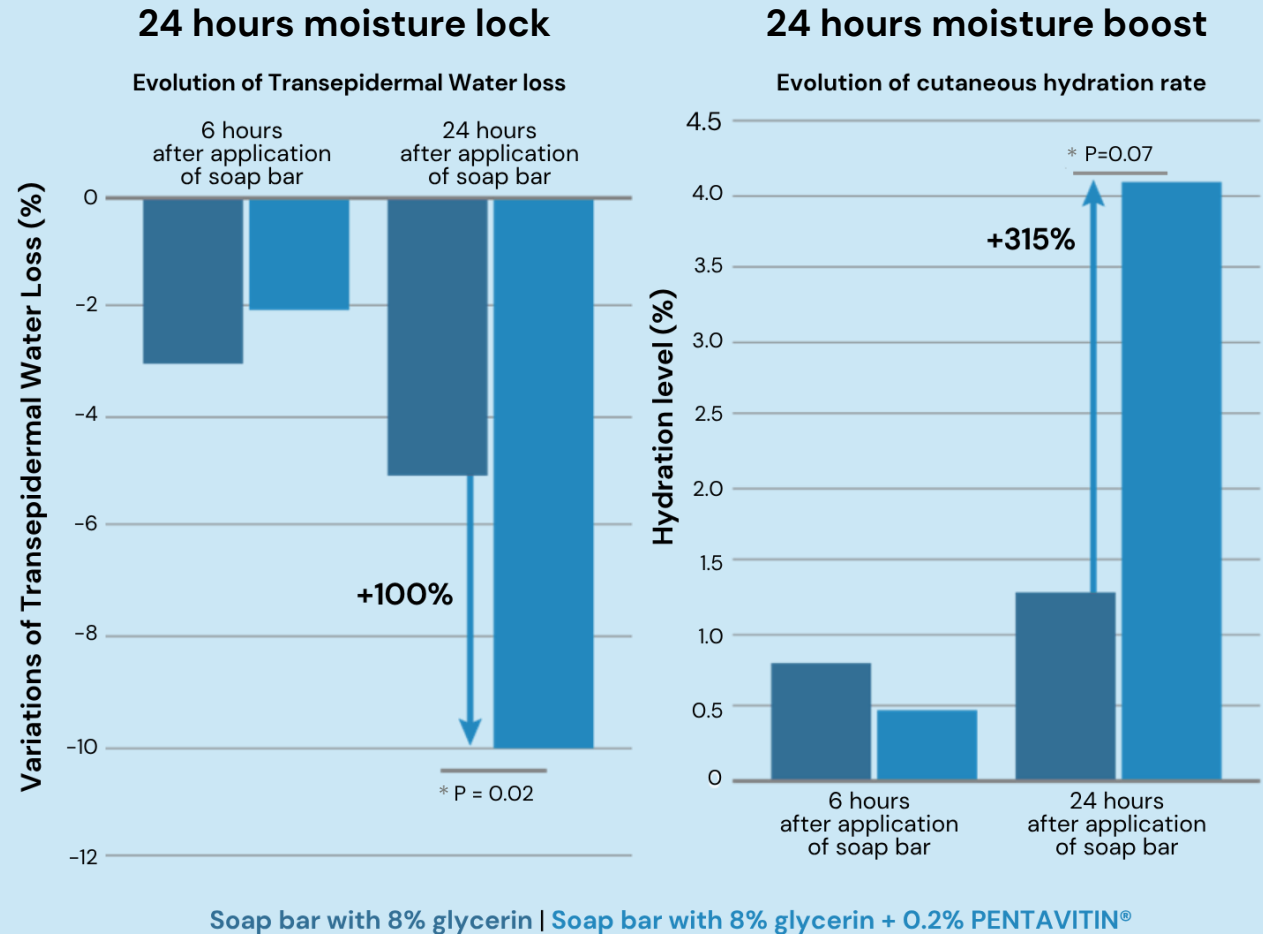


24-hour moisture boost & lock

Tested in a soap bar

- **24-hour moisture boost**
3 times more moisture after one single application of PENTAVITIN® (0.2%) in a moisturizing soap bar compared to placebo at 24 hours.
- **24-hour moisture lock**
PENTAVITIN® (0.2%) significantly helps to lock in moisture within the skin for up to 24 hours.
- **Hydration booster of glycerin**
After one single use, PENTAVITIN® (0.2%) significantly boosts the hydration efficacy of a moisturizing soap bar containing 8% glycerin at 24 hours.

in vivo

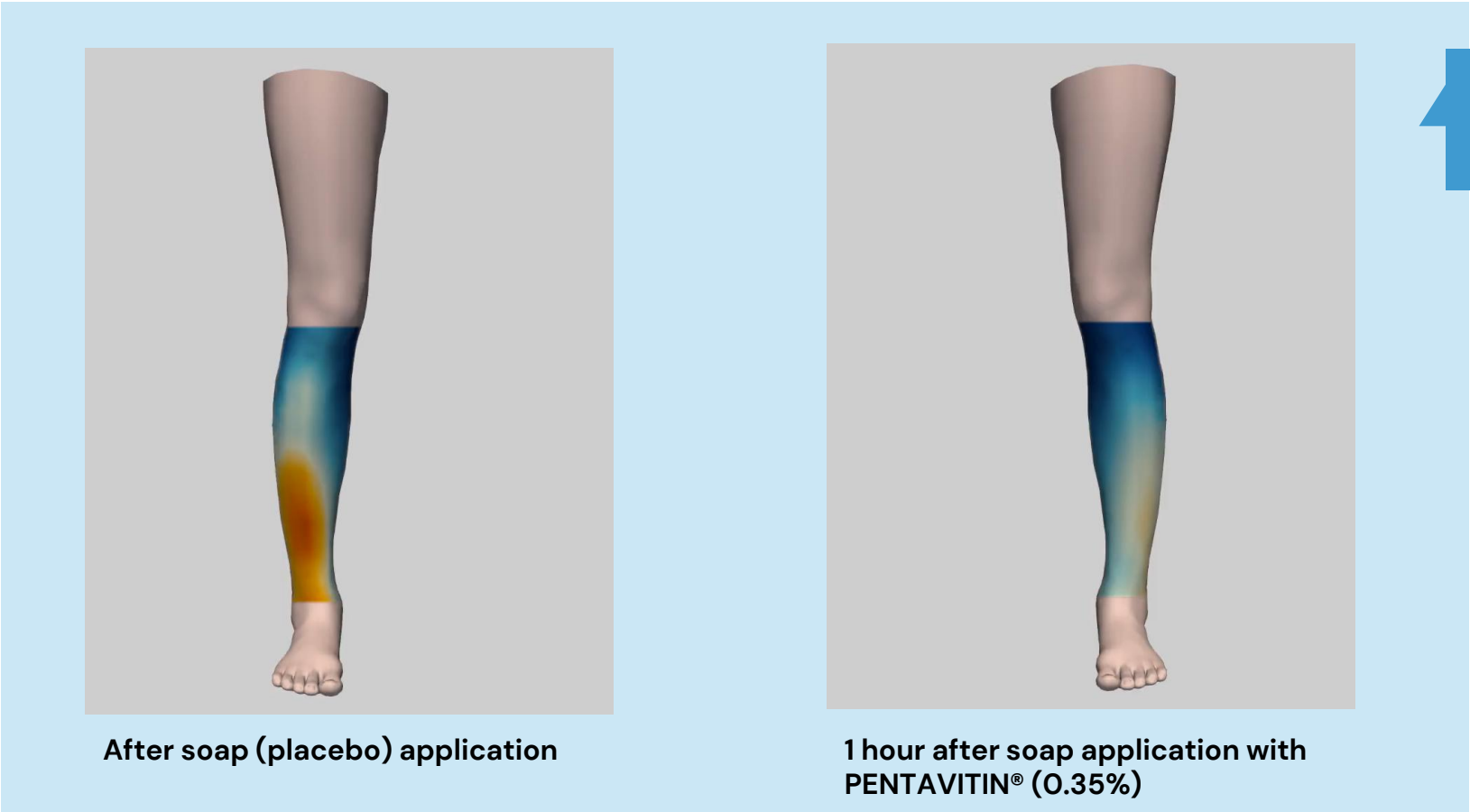
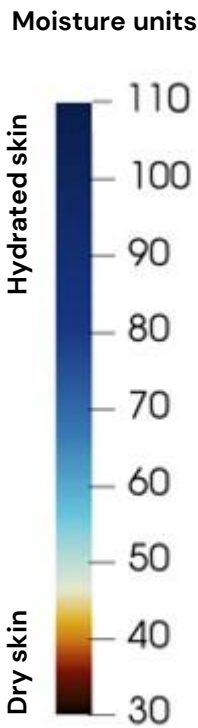


Instant body hydration after one single application

in vivo

Reduces unwanted effects of dryness caused by bar soap

Evaluation of skin hydration properties of a bar soap product with **PENTAVITIN®** after a single washing procedure (rinse-off application), by means of biometric measurements (Dermalab® Hydration device, CORTEX Technology, DEN). Measurement of 24 predefined sites on the lower leg 1 hour after application. Application was done on both legs on every individual, one leg was washed with placebo soap and the other leg with **PENTAVITIN®** soap.



PENTAVITIN®

Scalp Care

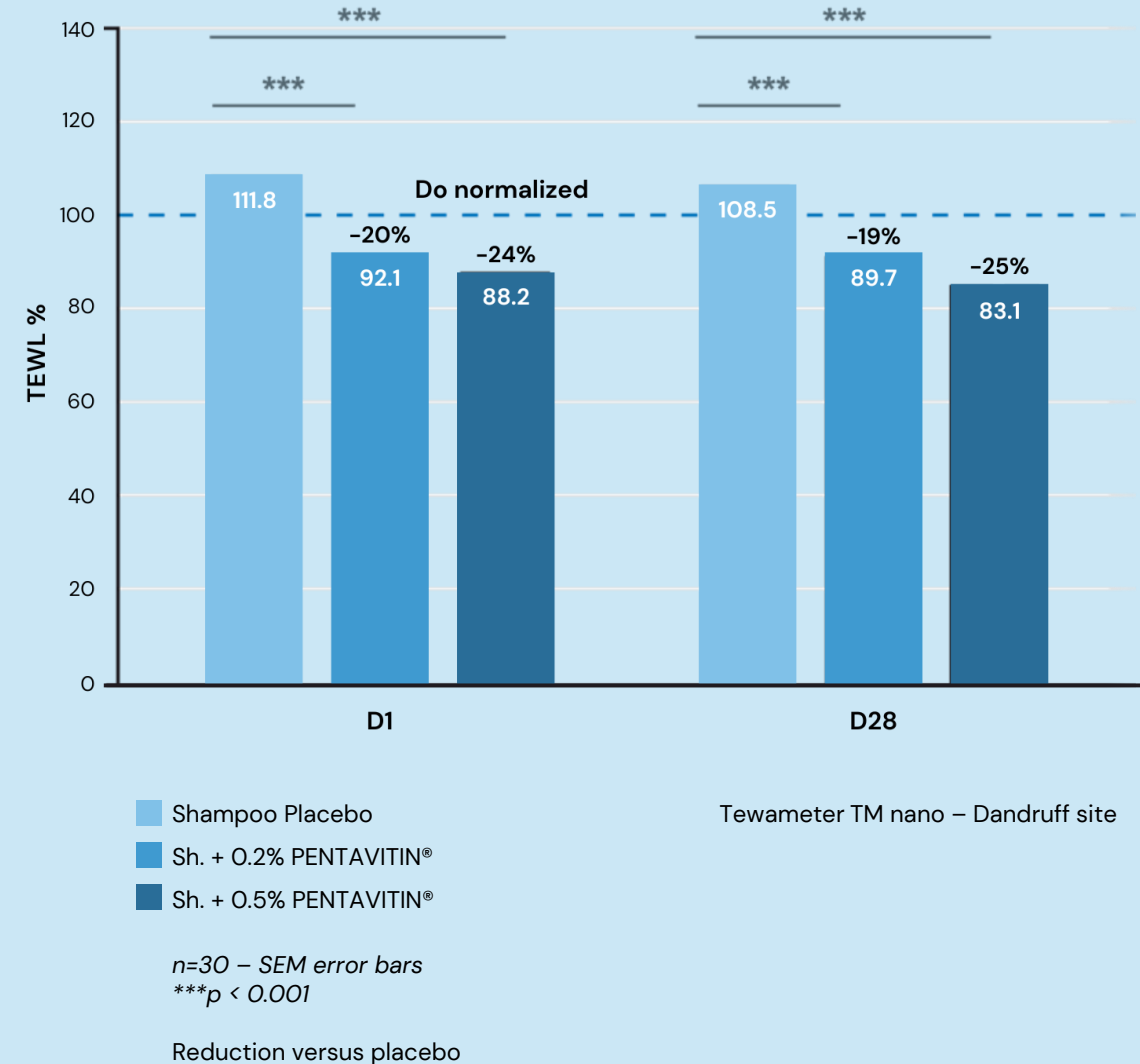


Reinforced scalp barrier

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.

in vivo

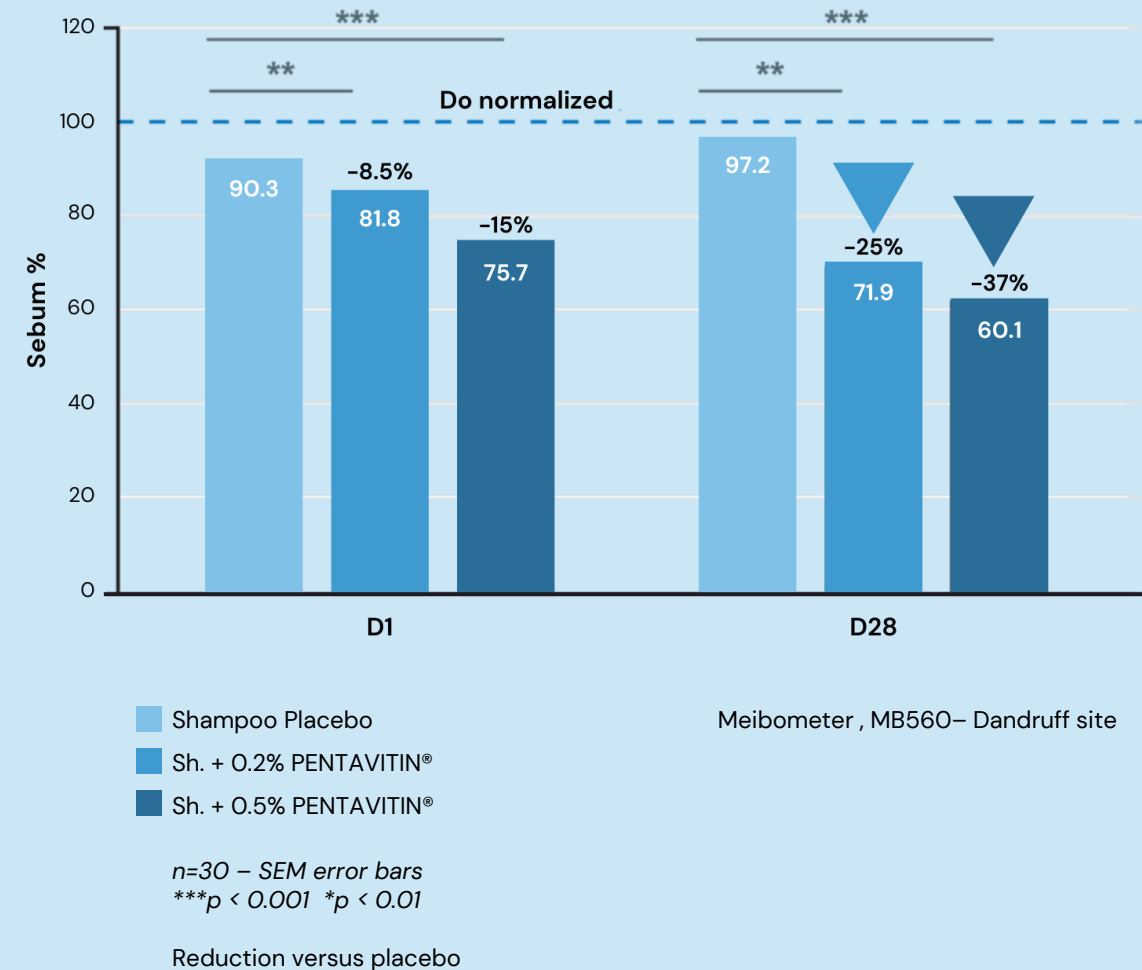


Scalp sebum reduction

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

in vivo

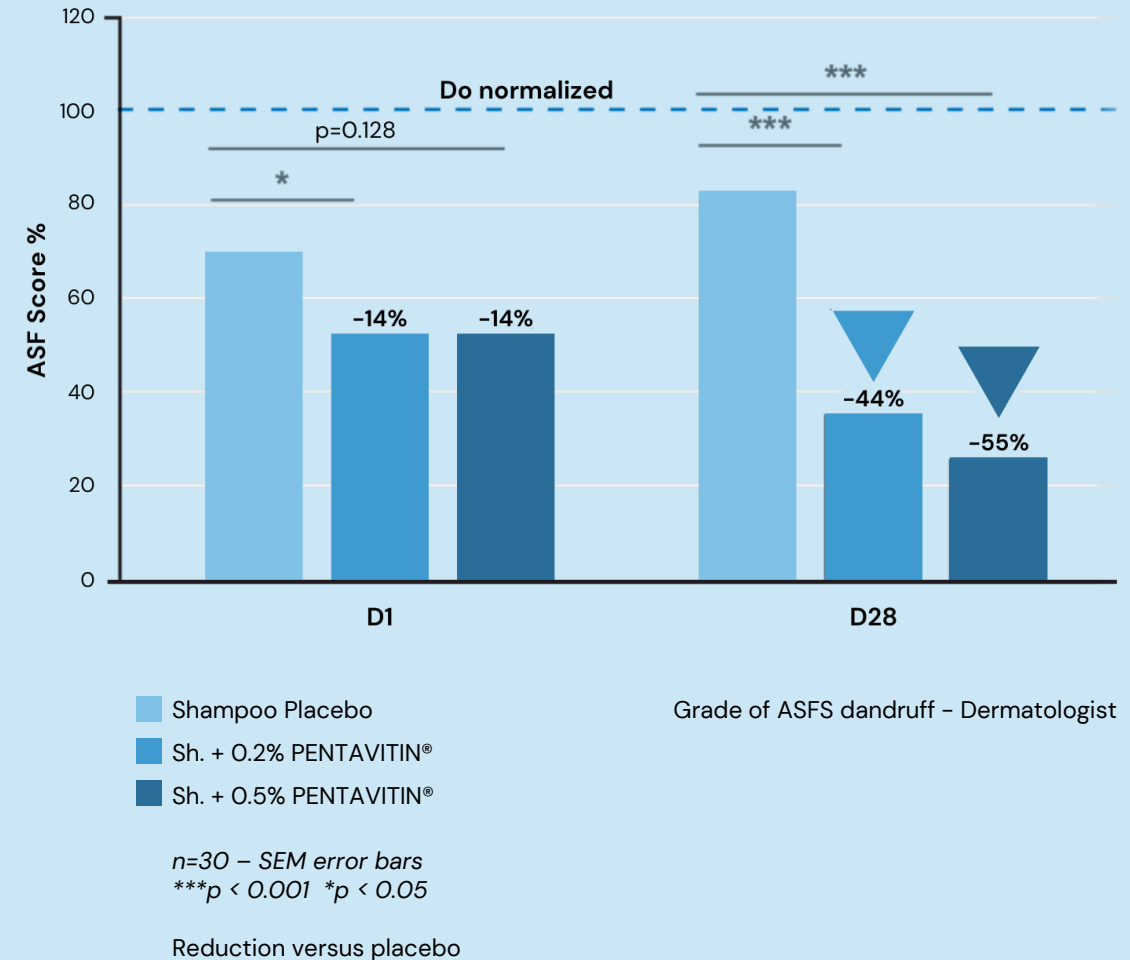


Reduced scalp flaking

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 and 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

in vivo



Visible flaking reduction

24 hour after one single application and frequent showering

in vivo



D0 - 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%)



D0 - 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%)

Fully hydrated scalp after frequent use

in vivo



Shampoo Placebo

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



Shampoo 0.5% PENTAVITIN®

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.

Visible sebum reduction after frequent use

in vivo



Shampoo Placebo

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

More sebum



Shampoo 0.5% PENTAVITIN®

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.

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