Revealing the Power of Vitamins for Beauty Care

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At DSM we believe that people naturally associate the beauty of vital, healthy looking skin and hair with vitamins.

DSM is proud to have pioneered the use of vitamins in cosmetic products, and because vitamins are so highly trusted we have made quality, reliability, traceability and sustainability the core values of our vitamin portfolio.

We place all our unparalleled experience and bright science in the service of our customers to satisfy people’s demands for novel vitamin beauty products.
Vitamins: first and most successful actives

The importance of vitamins in personal care

- In the **1940**’ first use of vitamins
- **Essential actives** for global and regional brands
- Mass market + premium products
- Very high **consumer awareness**
- “**Quality seal**” for consumers
DSM: The vitamin pioneer & leader

It has only been a century since the world first learned about "vitamins"

- **DSM, a pioneer in the vitamin journey**
  - As the longest-standing producer of vitamins in the world
- **DSM, a leader in vitamins for personal care**
  - The 1st to explore the beauty potential of vitamins with its skin research studies

Vitamin C industrial production, Grenzach, 1936
The Vitamins at a glance

**Vitamin E**
- Tocopherol, Tocopheryl Acetate
- Oily liquid
- The Vitamin antioxidant

![Tocopherol and Tocopheryl Acetate](image)

**Vitamin A**
- Retinyl Palmitate
- Yellow oily liquid
- The Normalizer
- Counteracts signs of aging
- Improves in particular skin elasticity

![Retinyl Palmitate](image)

**ProVitamin B5**
- D-Panthenol (75L), DL-Panthenol 50L
- Clear colorless liquid
- The Moisturizer

![D-Panthenol](image)
The Vitamins at a glance

**STAY-C® 50**
- Stable Vitamin C
- White powder
- The beauty remedy

**Biotin**
- Vitamin H
- White, crystalline powder
- Essential for healthy skin. Strengthens brittle nails

**Niacinamide PC**
- Vitamin B3
- White powder
- The appearance vitamin

\[
\text{Formula images for STAY-C® 50, Biotin, Niacinamide PC}
\]
The Vitamins at a glance

Folic Acid
- Vitamin B9
- Yellow powder
- Slows down premature skin aging
- Prevents DNA damage

BeauPlex® VH
All-in-one Vitamin compound containing
- Vitamin E
- Vitamin C
- Vitamin B3
- Vitamin B5
- Vitamin B6
- White powder
- For Vitamin claims

Radiance CR
Vitamin complex combining
- STAY-C® 50
- Biotin
- White powder
- Lightens age spots and skin tone
- Strengthens skin barrier
- Reduces wrinkles and smoothen skin surface
Vitamin E
Antioxidant protection for alluring skin every day

The protecting effects of Vitamin E are manifold and reported in many publications. But its central role is that of a strong antioxidant, capturing free oxygen radicals generated by exposure to UV-light or pollution and preventing damages.

- Prevents lipid peroxidation in cells and tissue
- Protects against formation of sunburn cells
- Boosts SPF of day care products and sunscreens
- Renders skin soft and smooth
- Enhances skin moisture
- Reduces inflammation
- Is the most important skin protective vitamin
Replenishment of Tocopherol skin reservoir by topical application of Vitamin E acetate

Level of Vitamin E in Skin

- Natural reservoir
- UV-light radiation
- Replenished by topical Vit E acetate in cosmetic products

Adapted from Passi et al. 2002
Vitamin E - Its delivery to the skin

- Single application of a 5% Vitamin E acetate in cream
- Determination of released tocopherol in the skin by GC-MS

Vitamin E Acetate is converted to Tocopherol in the skin

Vitamin E - SPF boosting effect

Alcoholic gel with 2.5% vitamin E acetate
- 1 application
- 1 application daily for 10 days

Commercial sunscreen, SPF 2
- 1 application
- 1 application followed after daily application of 2.5% Vit E gel during 10 days

Regular application of Vitamin E renders skin more resistant against erythema
Vitamin E - Price Differential

Company: Johnson & Johnson
Positioning Claim: provides clinically proven mildness
Without Vitamin E
Price: $3.79

Company: Johnson & Johnson
Positioning Claim: contains Vitamin E, gently absorbs excess moisture to keep skin dry and soft
With Vitamin E
Price: $4.79

The product with Vitamin E is priced 26% higher than the product without.
ProVitamin B5 - Panthenol
The Moisturizer

Panthenol is valued in skin and hair care for its moisturizing properties.
- In 1944, Pantene Hair Tonic inspired by Panthenol properties is born.
- Topical applications date back to the early 1960s with BePanthene.

Typically used forms of Vitamin B5 comprise Panthenol and Ethyl Panthenol.

- Acts as skin moisturizer.
- Has anti-inflammatory effect and soothes irritated skin.
- Stimulates epithelisation and helps to heal minor wounds.
- Acts as a humectant for hair.
- Improves the resistance of hair to mechanical stress.
ProVitamin B5 - Panthenol
Wound-healing effect

Panthenol - even at low concentrations - promotes skin regeneration of wounded skin

Weiser & Erlemann, 1987
**Vitamin A**  
The normalizer

The Vitamin A family consists of retinoic acid, retinol, retinyl palmitate, retinyl acetate.

Vitamin A Palmitate is also known as Pro-retinol.

- The anti-aging vitamin
- Stimulates cell renewal of the skin
- Improves elasticity
- Smoothens wrinkled skin
- Stimulates formation of collagen
- Helps restoring photo-damaged skin
Vitamin B3 - Niacinamide PC
For skin that shines with warmth and brightness

Niacinamide PC is a popular and widely used skin-lightening ingredient. However, its skin appearance benefit goes far beyond this.

- Nurturing an unblemished skin: anti-acne and skin lightening activity
- Maintaining a youthful looking skin: collagen synthesis stimulation and skin barrier strengthening

Our latest data about the protection potential of Niacinamide PC for UV challenged skin make it the ideal candidate for day care and sun care developments

DSM offers with Niacinamide PC a cosmetic grade of niacinamide with minimal residual nicotinic acid (max 200 ppm) to address any concerns about unpleasant skin sensations
Niacinamide PC improves skin moisturization

Niacinamide helps to keep skin moisturized and increases resistance to barrier damage
Niacinamide PC stimulates collagen production

Increased protein and collagen synthesis (% vs control) from human dermal fibroblasts by niacinamide

Fibroblasts from a 72 year old donor were incubated with 10mM Vitamin B3 for 48h

- Collagen: +54%
- Total protein: +41%
- Fibroblasts cells: +20%

Niacinamide PC improves the appearance of aging skin
Niacinamide PC lightens the skin

Influence on size of age spots compared to baseline

Niacinamide significantly reduced the size of age spots compared to the control treatment

Niacinamide PC may help to even skin imperfections caused by age spots

- split face test
- 138 volunteers
- 5% niacinamide applied for 8 weeks
- image analysis for spots around eyes and on cheek

Hakozaki et al. 2002
**Vitamin C - STAY-C® 50**
The all-round beauty solution for skin so beautiful it glows

STAY-C® 50 is our stable Vitamin C form. It is a powerful anti-oxidant and multi-talent beauty remedy addressing almost every skin concern from acne to UV damage.

- **Skin lightening activity**
  - STAY-C® 50 is an approved quasi-drug active ingredient for whitening products in Japan
- **Anti-acne activity**
  - Powerful in vivo results
- **Synergistic antioxidant activity with vitamin E**
- **Enhances skin firmness**
  - Stimulates collagen production
**STAY-C® 50**
Reduction of ROS in living skin

- Photo-damage occurs due to reactions involving reactive oxygen species (ROS) in the skin. Many visible signs of aging are attributed to ROS-induced photo-damage that accumulates over the lifetime.
- In a DSM study, STAY-C® 50 and Vitamin E acetate were shown to reduce ROS in living skin and improve protection provided by sunfilters.

Two-photon fluorescence image of live human skin showing the effect of three products on reduction of ROS after UV irradiation

- SPF 15
- SPF 15 + Vitamin E Acetate
- SPF 15 + Vitamin E Acetate STAY-C® 50

Image before UV-irradiation Blue = no ROS

Fluorescence Intensity Scale Bar

Min Max

* Study sponsored by DSM and published as: Hanson, 2002
STAY-C® 50
Effect on skin firmness

Cutometer measurement on inner forearm

Regular application of a STAY-C® 50 containing cream significantly firms skin

* p < 0.05
STAY-C® 50
Anti-acne activity

Clinical evaluation:
Number of inflammatory lesions: papules and pustules evaluated by dermatologist

* p < 0.001 compared to day 0

STAY-C® 50 significantly reduced inflammatory lesions
Folic Acid
Protection of cells against UV damage

Viability of primary human fibroblasts after UV-B radiation

Folic Acid increases viability of fibroblasts after UV radiation

Debowska et al, 2005
Radiance CR
Active Vitamin complex

RADIANCE CR is an active Vitamin complex for a radiant look consisting of a **stable Vitamin C derivative STAY-C® 50** and **Vitamin H (Biotin)** in a carrier.

Radiance CR is a multi-active ingredient for skin care
- Anti-age spot treatment → lightens age spot and skin tone
- Regeneration formulation → enhances skin barrier recovery
- Anti-aging products → reduces wrinkles, smoothen skin surface
Radiance CR
Lightening activity

Test:
13 volunteers
Cream with 5% of a biotin /STAY-C® 50 blend
Twice daily application

Measurement of ITA° vs baseline (Δ ITA°)

Δ ITA°

0 2 4 6 8 10 12 14 16

Placebo  Test

Month 1  Month 2  Month 3

* RADIANCE CR significantly lightens the skin

Other countries: pending
Radiance CR
Lightening activity

To reduce the signs of aging...

before

after 3 months

Images taken with digital camera Canon EOS D30
Radiance CR
Wrinkles reduction

Skin roughness measurement of eye region

After 3 months: 25 μm reduction of wrinkles

RADIANCE CR significantly smoothens fine wrinkles around the eye
Revealing the Power of Vitamins for Beauty Care

We want to engage with you to fully exploit the power of vitamins for your beauty brands.