

The Personal Care division of DSM Nutritional Products is the world's leading supplier of vitamins, bio-active ingredients and UV filters to the cosmetics industry. Since our merger with Pentapharm, a trendsetter in active ingredients for skin care, we are able to offer a complete and modern portfolio of services and products for sun, skin and hair care. The brand Pentapharm forms our innovative portfolio of active ingredients for skin care. Every product comes with claim substantiation and an extensive product dossier, including safety aspects and *in vivo* as well *in vitro* studies.

We offer innovative ingredients produced by means of peptide synthesis, extraction of natural substances and biotechnology. Our ALPAFLOR® product line extends our portfolio in the broad field of natural substances; following strict organic rules, the developed high-quality extracts are certified by Ecocert® and Natrue as raw materials for natural and organic cosmetics.

Our knowledge and years of experience in marketing and claim substantiation, our comprehensive support in formulation and application, and our regulatory expertise, together with a global distribution network, enable us to best meet our customers' needs.

For more information, please visit us online at www.dsmnutritionalproducts.com

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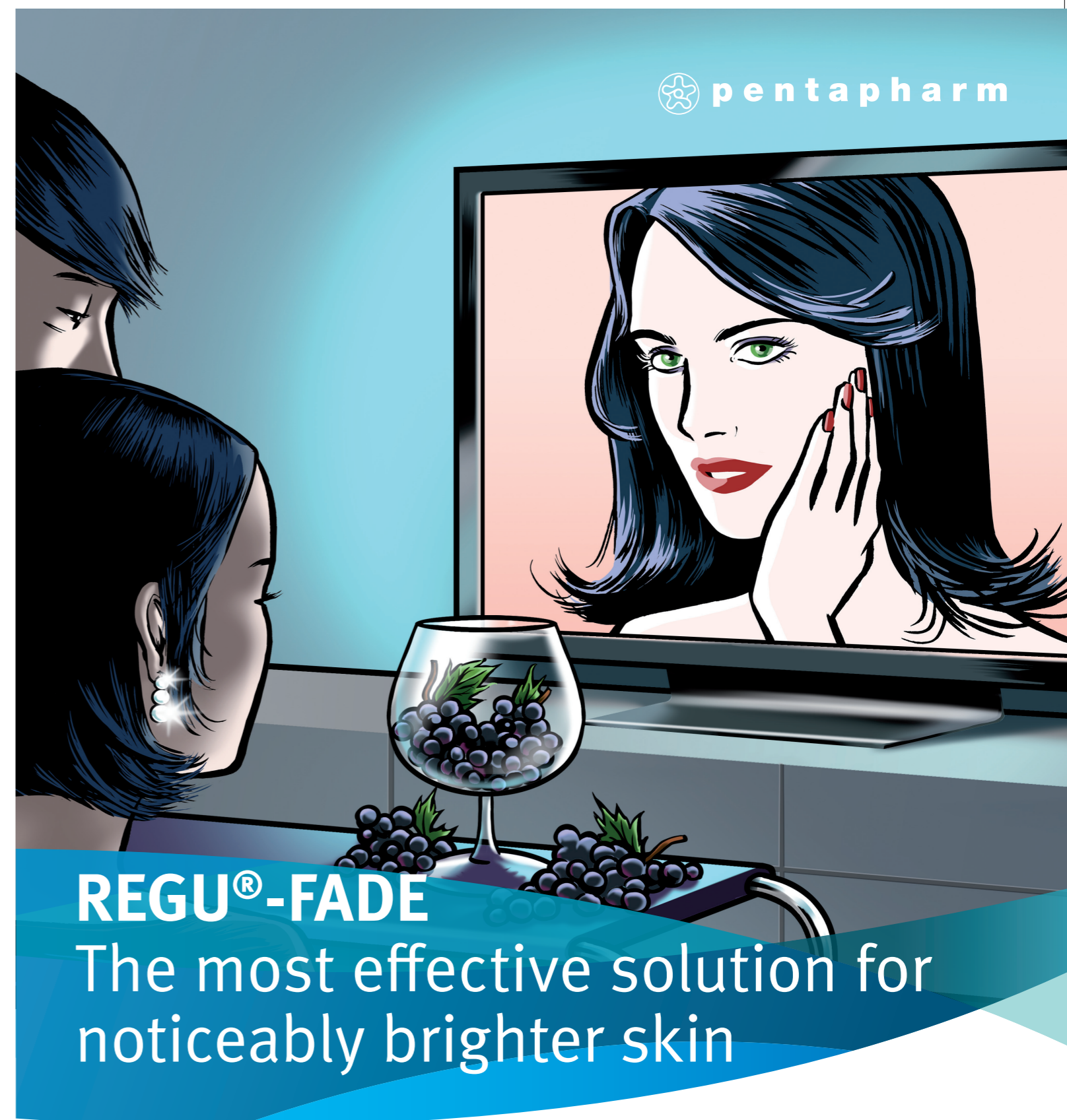
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pentapharm

REGU®-FADE
The most effective solution for
noticeably brighter skin

A growing segment

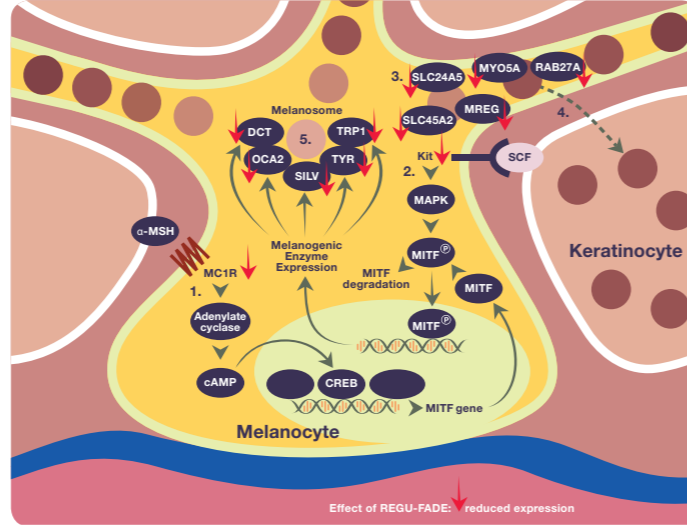
Skin brightening is one of the fastest growing segments in the cosmetic industry. In Asia skin brighteners are widely used to make skin fairer. In Western countries consumers want to diminish age spots, reduce excessive pigmentation and achieve an even skin tone. As a consequence, these markets are looking for increasingly efficient, fast-acting skin brighteners. At the same time, these actives must be absolutely safe for cosmetic use.

REGU[®]-FADE is high-performing and fast-acting. It uses pure nature-identical trans-resveratrol that is free from pesticides and emodin, addressing high consumer awareness about safety and visible effects. Resveratrol is a known potent antioxidant found in red grapes and associated with various health benefits.

REGU[®]-FADE has proven its outstanding efficacy in human clinical trials with visible effects in only 2 weeks. Compared with a market benchmark, REGU[®]-FADE worked faster early on and reduced the production of melanin more effectively throughout the studies. DSM scientists showed that REGU[®]-FADE attenuates skin pigmentation via multiple mechanisms, from initial signaling and gene expression to melanin production and final melanosome transfer.

Mechanism

Skin pigmentation involves many genes at various steps. A gene expression test (RT-PCR) has been performed and showed that REGU[®]-FADE (0.002%) is very effective in attenuating the melanin production cascade at multiple points.



1 | α-MSH signalling

REGU[®]-FADE downregulates the MCR1 (α-MSH receptor) expression level to 49% in melanocytes, leading to decreased expression of MITF-related genes such as TYR (tyrosinase), TRP1, DCT, SILV and OCA2 which reduces melanin synthesis.

2 | KIT signalling

REGU[®]-FADE decreases KIT (=stem cell factor receptor) gene expression to 58% in melanocytes which additionally reduces melanin synthesis.

3 | Melanosome function and maturation

REGU[®]-FADE also affects the function and maturation of melanosomes by reducing SLC24A5 (-39%) and SLC45A2 (-74%) gene expression levels.

4 | Melanosome transport

REGU[®]-FADE attenuates melanosome transport within melanocytes, shown by the reduction of the MYO5A (-55%) and MREG (-69%) gene expression levels, as well as melanosome transport to keratinocytes, shown by the reduction of RAB 27A (-24%) gene expression levels.

5 | Melanin synthesis

REGU[®]-FADE reduces the conversion of tyrosine into eumelanin or pheomelanin at various points, shown by the downregulation of OCA2 (-37%), TYR (tyrosinase) (-31%), DCT (-85%) and TRP1 (-63%) gene expression levels.

Key facts

Benefits

- Visibly brighter skin in 2 weeks
- Nature identical pure trans-resveratrol for more effective and even skin brightening
- Multi-target mechanism

Cosmetic application

- Skin brightening facial and body care products
- Creams and serums for age spots
- Anti-aging skin care products for more even skin tone

Suggested concentration

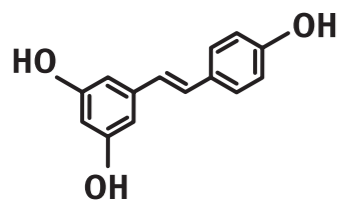
- Up to 1% REGU[®]-FADE in cosmetic formulations

INCI name

- Resveratrol

Structure

- trans-Resveratrol (molecular weight: 228.25 g/mol)

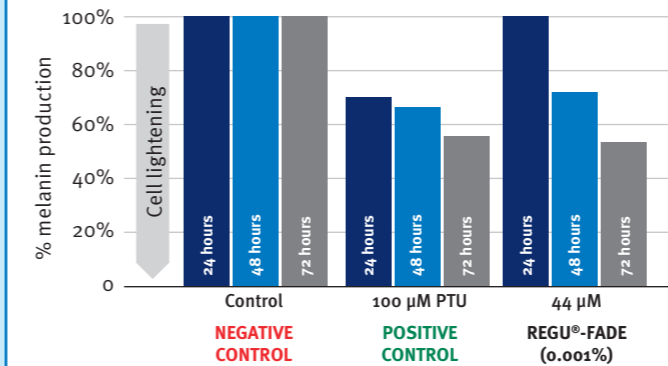


Efficacy

In vitro

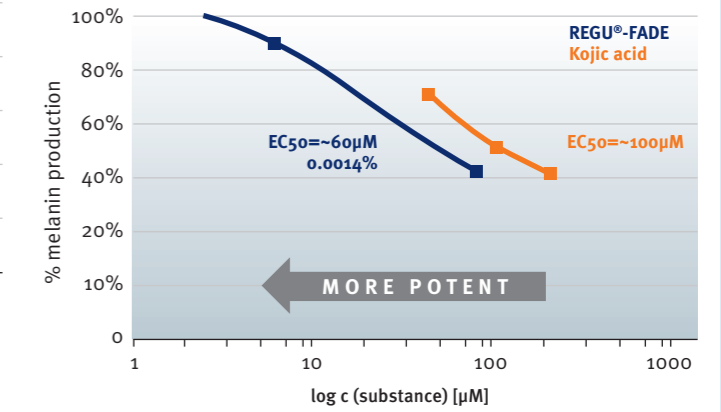
Melanin assay on B16F10 cells

Low concentration REGU[®]-FADE (0.001%) leads to a 50% reduction of melanin content.



Melanin assay on normal human melanocytes

REGU[®]-FADE (0.0014%) decreases melanin production with higher activity than kojic acid.

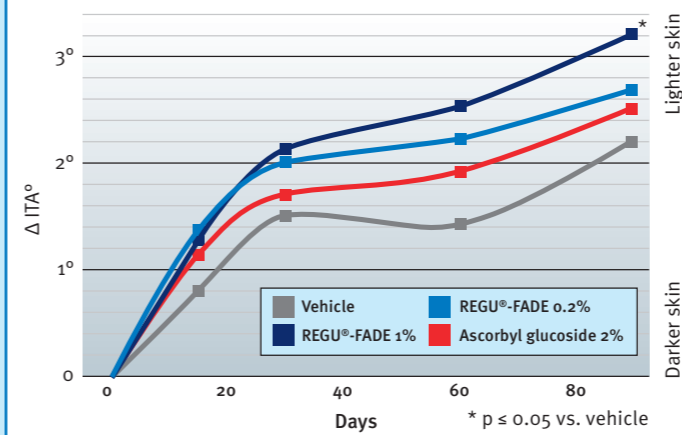


In vivo

Long-term study

A double-blind, placebo-controlled study was performed on 52 Indian female volunteers. Per test area a cream (SPF ~10) plus test substance was applied twice daily on the forearms. Colorimetric measurements were performed after 14, 28, 60 and 90 days respectively.

Significant skin brightening with 1% REGU[®]-FADE



Short-term study

A double-blind, placebo-controlled study was performed on 12 Caucasian volunteers. Per test area creams were applied 3 times per day on the forearm. Colorimetric measurements were performed after 14 days.

Visible and significant skin brightening in 2 weeks with 1% REGU[®]-FADE

