Technical Information

TEGO® Pep 4-Vitality

Energize skin integrity to renew healthy appearance

Intended use

Active ingredient for cosmetic applications

Benefits at a glance

- Enhanced fibroblast functionality in aging skin
- Reinforce the ECM in aged skin with enhanced collagen production

INCI (PCPC Name)

Tetrapeptide-61

Chemical and physical properties (not part of specifications)

Appearance	White Powder
Actives matter	1
Usage level	1 - 50 ppm

Properties

TEGO® Pep 4-Vitality is a peptide with naturally occurring amino acids. This tetrapeptide sequence, Alanyl-Glutamyl-Aspartyl-Glycine, is the active component, epitalon, from epithalamin. This component has been cited in research journal articles to act on telomeres to promote telomere elongation for anti-aging effects. In doing so, TEGO® Pep 4-Vitality improves skin vitality and gives the skin a younger appearance.

Scientific literature summary

Through extensive literature review, several studies illustrating cosmetic application value for this material have been identified and summarized below:

Epitalon acts on telomerase with an increase in activity and length

Bulletin of experimental biology and medicine, 135(6), 590-592.

The telomerase theory of aging posits that symptoms of aging such as a decrease in tissue proliferation are due to critical shortening of the telomeres during cell division. This issue is caused by an asymmetry in the leading and lagging strands of DNA during synthesis. Therefore, epithalon, an amino acid, was investigated for its effect on telomerase activities with potential application for telomere elongation.

In testing, it was found that the mean and maximum length of telomeres treated with epithalon were increased in fetal fibroblasts when compared with control cells. The mean treated telomere length increased a significant amount to 240 arb. units, as compared to the control cells with 180 arb. units. Therefore, it was determined that epithalon could induce the expression of telomerase enzyme components, improve telomerase activities, and positively affect telomerase elongation.

Epitalon increases fibroblast activities in aged skin

Bulletin of experimental biology and medicine, 161(1), 175-178.

Aging of fibroblasts from internal and external factors affects some of the key component levels such as collagen and hyaluronic acid. Aging interrupts the balance between apoptosis, of which caspase-3 is a key marker, and proliferation, of which Ki-67 is a key marker, in the skin cells. Additionally, CD98hc is the marker for skin fibroblast regeneration. A variety of short peptides including epitalon (AEDG), which has known antioxidant properties, contributes to telomere lengthening, and increases skin moisturization, were investigated for their effects on skin cell renewal. The results associated with epitalon are expressed below.

Epitalon was found to have a variety of effects on skin fibroblasts. First, Epitalon enhanced Ki-67 expression by about 2.08 times in young cultures and 4.94 times in aged cultures, indicating enhanced fibroblast proliferation. Secondly, epitalon did not enhance caspase-3 in young cultures, but, in aged cultures, caspase-3 was expressed at 5.05 times the normal amounts for a balanced skin cell apoptosis. Lastly, epitalon

increased CD98hc, a marker for skin cell activity, by 2.94 times in young cultures and 6.75 times in aged skin cell cultures. Take together, the mechanisms of epitalon suggested to activate skin cell proliferation and decelerate certain processes related to skin aging. Epitalon was found to have a more pronounced geroprotective effect than other peptides tested (KE, KED, and AED) with strong potential for treating aged skin conditions.

Epitalon increases cell functions of older skin cells
Adv Gerontol 5, 176-179 (2015).

Skin aging affects fibroblast-related functions which lead to disruption of the ECM. The decline of fibroblast activities can manifest as impaired collagen synthesis and ECM remodeling. Epitalon was studied as a peptide capable of stimulating cell proliferation.

Epitalon was found to stimulate culture skin cells with a 30% increase in the area index (ratio of total explant area vs. area of central explant zone) relative to the control at 1 or 2 ng/ml concentration for improved regeneration. Epitalon could penetrate the cell membrane and was able to maintain skin cell function.

Epithalamin, with an active component of epitalon, improved skin's antioxidant capacity
Archives of gerontology and geriatrics, 44 Suppl 1, 213-216

Reactive Oxygan Species (ROSs) damage cell macromolecules and culminate in mutations and genome instabilities, thereby resulting in aging related phenomena. Epitalon, a biologically active compound of the pineal gland, was studied for its ability to provide geroprotective and antioxidant capabilities. This study used epithalamin to study epitalon, which is probably its active fragment.

Treatment with epithalamin interacted with the initial stages of lipid peroxidation and also resulted in a significant increase in total antioxidant activity. Further, one week after treatment with epithalamin started, the SOD activity was significantly increased.

SimDerma Findings

A multi-parametric *In vitro* platform that includes over 20 targets laboratory assays to better characterize single ingredient indicators and match with skin claims. A summary of applicable positive results for this ingredient are expressed below:

- With use of TEGO® Pep 4-Vitality, positive influence (+ ≥ **20% activity**) is detected.
- From the assay targets – there is a positive indication for autophagy induction (++), CB1 agonism, melanin inhibition.
- When targets are paired to the claims, we see positive correlation to anti-aging, anti-oxidative stress, anti- wrinkle, skin barrier repair and skin rejuvenation.

Formulation Hints

Recommended usage concentration: up to 20 ppm for leave-on and up to 50 ppm for rinse-off application

Solubility: TEGO® Pep 4-Vitality is water soluble.

Preparation of emulsions: The peptides should be added as aqueous solution during the cooling process of emulsions at temperatures below 40 °C.

Applications

- Skin Care
- Color Cosmetics
- Deodorants
- Sun Care

Recommended usage concentration

TEGO® Pep 4-Vitality has been shown to be safe for use in cosmetics with a wide range usage level. The recommended usage level ranges from 1 - 50 ppm.

Hazardous Goods Classification

Please refer to our material safety data sheet for information concerning

- Classification and labelling according to regulations for transport and for dangerous substances
- Protective measures for storage and handling measures in case of accidents and fire
- Toxicity and ecological efficient

Literature Citation

1. *Khavinson, V., Bondarev, I. E., & Butyugov, A. A. (2003). Epithalon peptide induces telomerase activity and telomere elongation in human somatic cells. Bulletin of experimental biology and medicine, 135(6), 590-592. https://doi.org/10.1023/a:1025493705728*

2. *Lin'kova, N. S., Drobintseva, A. O., Orlova, O. A., Kuznetsova, E. P., Polyakova, V. O., Kvetnoy, I. M., & Khavinson, V. (2016). Peptide Regulation of Skin Fibroblast Functions during Their Aging In Vitro. Bulletin of experimental biology and medicine, 161(1), 175-178.*

3. *Chalisova, N.I., Linkova, N.S., Zhekalov, A.N. et al. Short peptides stimulate cell regeneration in skin during aging. Adv Gerontol 5, 176–179 (2015). https://doi.org/10.1134/S2079057015030054*

4. *Kozina, L. S., Arutjunyan, A. V., & Khavinson, V. (2007). Antioxidant properties of geroprotective peptides of the pineal gland. Archives of gerontology and geriatrics, 44 Suppl 1, 213-216. https://doi.org/10.1016/j.archger.2007.01.029*

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