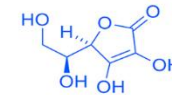




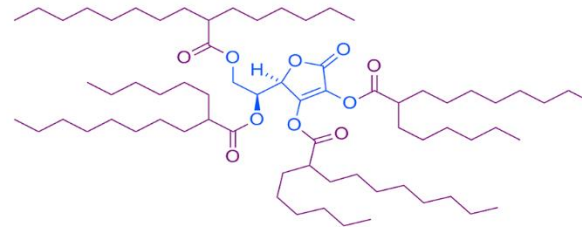
**Vitamin C TetraE**

# Vitamin C TetraE

Vitamin C TetraE is ASCORBYL TETRAISOPALMITATE; a stable, fat-soluble Vitamin C ESTER with proven efficacy



Ascorbic Acid



Ascorbyl Tetraisopalmitate

**100% designed and manufactured in France**

## Vitamin C TetraE vs Vitamin C

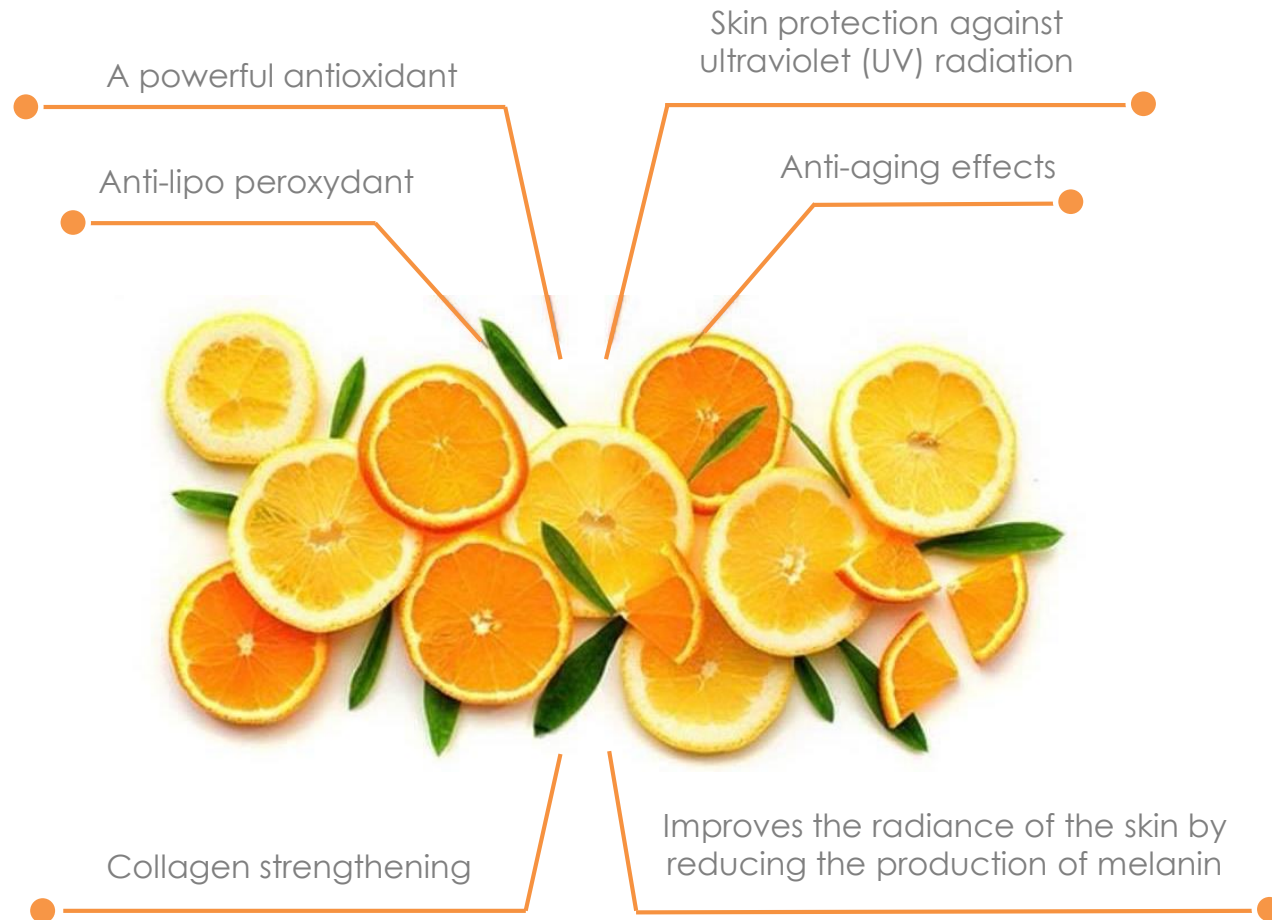
- Topical delivery of ascorbic acid is complicated by its instability and its water solubility in penetration of the lipophilic stratum corneum.
- As L-ascorbic acid is water soluble, it is prone to oxidation in solution, resulting in the by-product dehydroascorbic acid. It was identified that L-ascorbic acid must be formulated at pH levels less than 3.5 to enter the skin and the maximal concentration for optimal percutaneous absorption was 20% (20).
- Ascobyl tetraisopalmitate does not require a low pH (acidic) environment to penetrate the skin causing scaling, tingling, irritation and dryness of the skin.
- Ascobyl tetraisopalmitate has a penetration ability three times greater than ascorbic acid (1) (2).
- Ascobyl tetraisopalmitate is able to produce better results even if it is used at doses 25 times lower than those of ascorbic acid (2).



VS



# The benefits of vitamin C for the skin

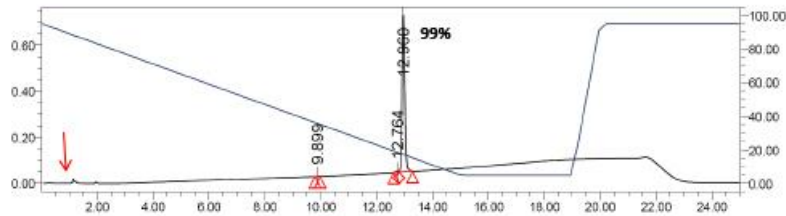


# Vitamin C TetraE, > 98% purity (LC-UV)

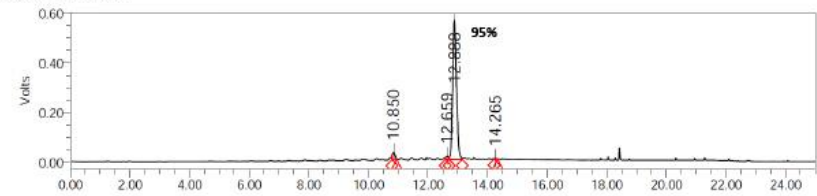
LC UV (220 nm)

LC Corona

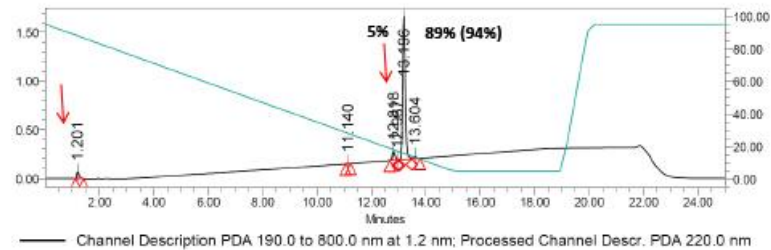
Vitamin CTetraE



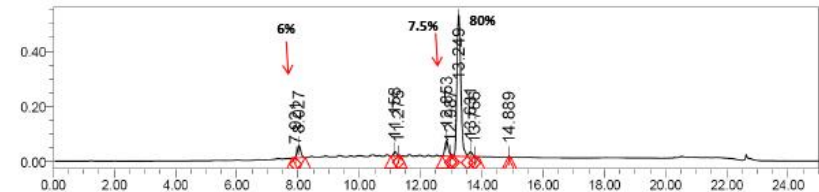
Vitamin CTetraE



Positive Control

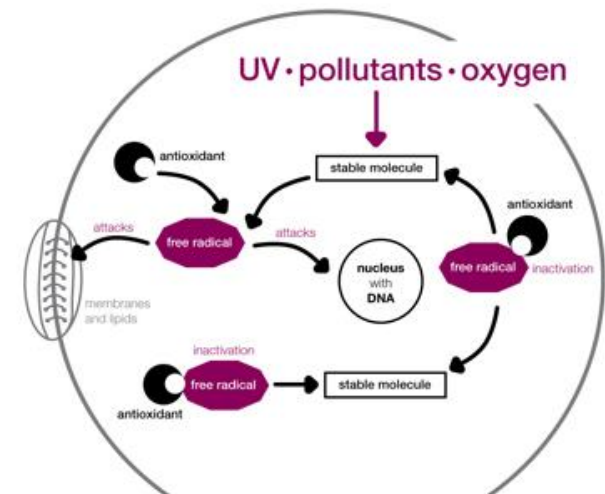


Positive Control



# Vitamin C TetraE, a free-radical scavenging

- The skin is the most exposed organ to the environment
- The reactive oxygen species or ROS begin to accumulate in your body and more specifically in the skin (6) with increasing aging.
- Oxidative stress also increases with exposure to environmental pollutants and UV radiation (5) (9).
- An increase in oxidative stress damages the skin. This stress has the effect of stimulating the production of melanin, to block the synthesis of collagen while stimulating its degradation. This results in skin that wrinkles and is pitted with age spots, with uneven pigmentation (7).
- Ascorbyl tetraisopalmitate is the vitamin C derivative best known for its ability to neutralize ROS at the cellular level (8).
- Ascorbyl tetraisopalmitate has shown its beneficial effect on hair damaged by oxidative stress (9).



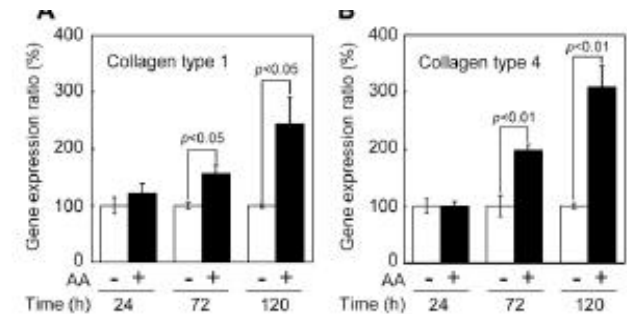
# Vitamin C TetraE, a powerful anti-aging

- The main signs of aging are wrinkles, uneven skin tone, rough skin texture and reduced radiance. These visual effects are born at the heart of the skin and are the result of reduced collagen production, increased photosensitivity and decreased hydration. These causes may be correlated with poor diet, overexposure to the sun, environmental pollutants, and poor hydration (10).
- Vitamin C and its derivatives help to improve the appearance of the skin, thanks to their anti-aging benefits: better cell survival, better hydration and more collagen synthesis (11) (12).
- Statistically significant differences in clinical scoring of facial wrinkles at the end of the 90-day study were detected in the perioral and cheek areas (2).
- Biopsies of treated versus untreated areas confirmed the presence of increased amounts of collagen in those patients showing clinical improvement (2).

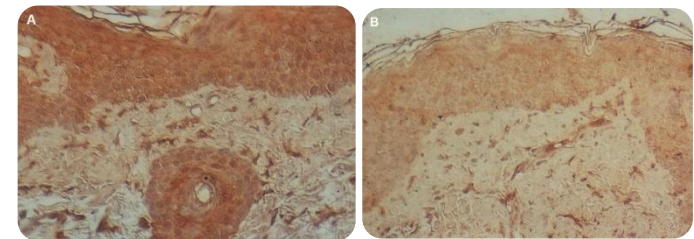


# Vitamin C TetraE, a collagen booster

- Collagen is a major protein fiber of the skin. This fiber ensures the architecture and the maintenance of the skin. It gives the skin a firm and youthful appearance.
- As we get older, and under the influence of environmental aggressions, UV, pollutants and other free-radicals, the skin fibers deteriorate. Another internal natural factor acts on the breakdown of collagen, it is the enzyme of Collagenase, it is the natural agent of degradation of the collagen. This enzyme achieves rapid degradation of cutaneous collagen (17).
- Vitamin C is notorious for its essential role in collagen biosynthesis. It is a cofactor for both lysyl and prolyl hydroxylase, which hydroxylate lysine and proline in collagen, creating the triple helical structure(19). Collagen synthesis is also directly stimulated by increased transcription and stabilization of procollagen messenger ribonucleic acid (mRNA) of collagen type I and type III (20).
- Vitamin C also plays a role in collagen synthesis at the level of gene expression (22) It has been shown to up-regulate collagen synthesis and increase the synthesis of the inhibitor of metalloproteinase-1 (23) which decreases UV-induced collagen degradation.



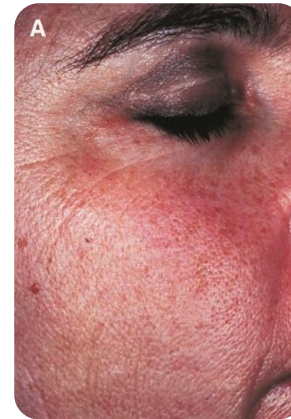
Effect of AA on type 1 and 4 collagen mRNA expression in human skin fibroblasts treated with 100  $\mu$ M AA (18)



- A) Immunohistologic staining for mRNA for collagen type I in biopsy of the Ascorbyl tetraisopalmitate treated skin
- B) Less visible staining is seen on the placebo side

# Vitamin C TetraE, photoprotection and melanogenesis inhibition

- Over time exposure to UV radiation, affects the skin and its appearance. UV exposure causes inflammation of the superficial layers of the skin (epidermis and dermis). This exposure causes deep damage to the keratinocyte DNA of the skin and causes them to die quickly after a process called apoptosis. In addition, UV rays increase the thickness of the skin and also increase melanin production. The result is thick, coarse, wrinkled and hyperpigmented skin (13).
- Topical application of Vitamin C has been shown to significantly elevate cutaneous levels of this vitamin, and this correlates with protection of the skin from UVB-induced oxidative damage as measured by a decrease in UVB erythema and sunburn cell formation (24).
- Melanocytes are melanin-producing specialized cells located in the skin's epidermis. Melanin is a dark pigment primarily responsible for skin color. Vitamin C reduces the melanocyte activation through a free-radical scavenging (16).
- With the usual preparations of vitamin C, there is a weak effect of suppression of melanogenesis (14), whereas many clinical studies show, that with products based on Ascorbyl tetraisopalmitate, an important lightening of the skin and a reduction in melanogenesis (2) (3) (4) (15) (16).



- A) Significant facial photodamage with textural irregularity as well as deep lines prior to therapy
- B) Visible improvement in texture and lines is seen after 90 days of topical Vitamin C

# Vitamin C TetraE, technical data sheet

- INCI: Ascorbyl tetraisopalmitate
- Other INCI : Tetrahexyldecyll ascorbate
- CAS: 183476-82-6
- CHINA Compliant ; Quasi-drug statute in Japan at 3% ; Whitening statute in Korea at 2%
- APPEARANCE: clear to light yellow
- FORMULATION: oil phase soluble
- STORAGE CONDITIONS: Container closed, 18 months in the dark at room temperature
- DOSAGE of use : 1 to 3%
- TOXICOLOGY: Safety Assessment of Ethers and Esters of Ascorbic Acid as Used in Cosmetics 2016, available on request

# Vitamin C TetraE , conclusion

1. Purity > 98%
2. Penetration ability three times greater than ascorbic acid and better results even if it is used at doses 25 times lower than those of ascorbic acid
3. Ability to neutralize ROS at the cellular level thanks to free radical scavenging activity
4. Recognized anti-aging effects
5. Collagen booster
6. Effective photo-protection
7. Improvement in skin radiance by reducing melanin production



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