

Contains Vitamin C, active ingredient with antioxidant and restorative properties of the dermal matrix, protecting the skin from photo-aging, lightening and whitening pigmentation spots and revitalizing the skin.

**Vitamin C**, or L-ascorbic acid, acts as a cofactor for collagen synthesis. It has a high regenerating ability, by its collagen synthesis stimulating activity.

Vitamin C is essential for the proline hydroxylation, therefore in the development and maintenance of collagen integrity. In addition, vitamin C inhibits the synthesis of Extracellular Matrix Metalloproteinase enzymes of, enzymes which stimulates collagen degradation in the dermis.

Vitamin C's collagen stimulating properties provides it with wound healing properties, caused by trauma, cuts, burns, or surgery. It is also suitable for the formation of new tissues.

Vitamin C belongs to the group of water soluble vitamins, and like most of them, it is not stored in the body for a long period of time, but in small quantities which are eliminated through urine. For this reason, Vitamin C daily administration is important in order to provide sufficient antioxidant protection.



Its chemical structure is similar to that of glucose (in many mammals and plants, this vitamin is synthesized from glucose and galactose). All compounds which possess the biological activity of ascorbic acid are known as Vitamin C. We should note that the only active form of Vitamin C is L-Ascorbic Acid.

As Vitamin C is a water-soluble substance, it is rapidly eliminated from the organism. Our body tends to protect vital organs, so any vitamin deficiency is felt primarily in the skin (less vital organ), which explains the **importance of its topical application**.

Pure Vitamin C is very unstable and sensitive to oxidation. Vitamin C contained in **VITAMIN C REVITALISE** is **stabilized by an ethyl group and its effectiveness has been tested clinically**:

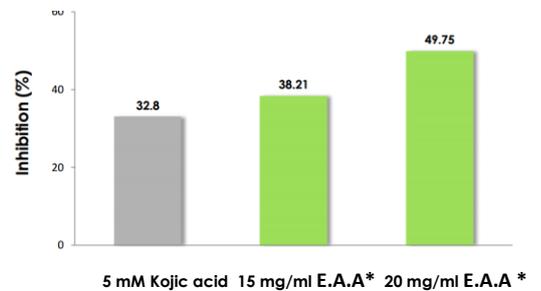
## Clinical Efficacy Studies

### 1- In-vitro whitening activity study - melanin assessment on human melanocytes:

An in-vitro evaluation of the **Ethyl Ascorbic Acid anti-pigment ability** was performed (Ethyl Ascorbic Acid is the Vitamin C form contained in VITAMIN C BRIGHTNESS SPRAY). Theophylline was incubated with melanocytes in order to increase melanin production. Subsequently, **Ethyl Ascorbic Acid** was added at concentrations of 15 mg / ml and 20 mg / ml respectively, and comparing with kojic acid, a known anti-pigment ingredient.

At both concentrations of **Ethyl Ascorbic Acid** clear depigmentation effect was observed, obtaining **49.75%** whitening effect with 20mg/ml **Ethyl Ascorbic Acid**:

Whitening Effect (%)



\* E.A.A: Ethyl Ascorbic Acid



### 2- In-vivo whitening efficacy

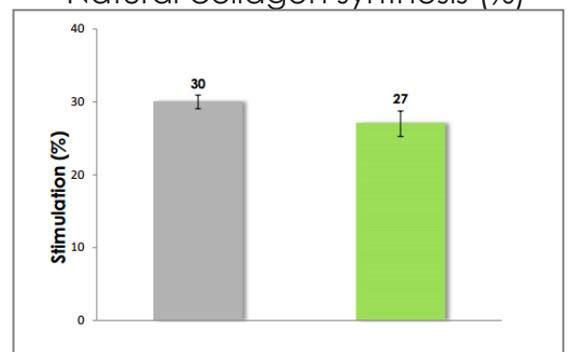
A study on the in-vivo **whitening** capacity of Vitamin C (as **Ethyl Ascorbic Acid**) for 28 days in 20 healthy Asian women aged 25 to 40 years old with skin type III was performed.

A significant improvement in the skin lightening measured by chromatography observed:

### 3- Stimulation of natural collagen synthesis:

The **Stimulation of natural collagen synthesis** activity was evaluated on human fibroblast culture. After 24 hours of culture, the collagen was quantified using a Sircol Quantification Kit. Vitamin C had a similar effect on collagen synthesis that of TGF  $\beta$ 1 (growth factor which stimulates collagen synthesis):

Natural collagen synthesis (%)



10 ng/ml TGF β1      500 ppm E.A.A. \*  
 \* E.A.A: Ethyl Ascorbic Acid

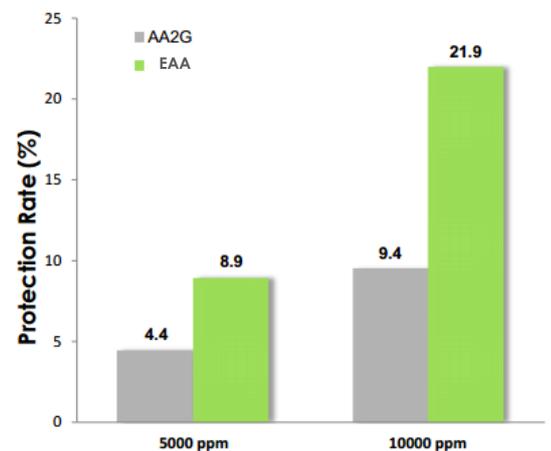
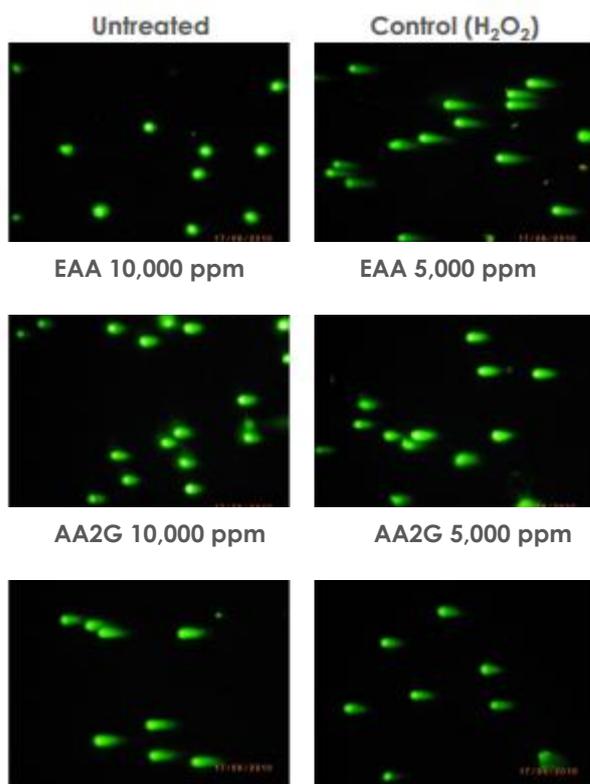
**4- DNA protection by Comet assay in human fibroblasts:**



The comet assay is a technique used to detect DNA damage and cell repair capacity. It is based on the DNA labile alkaline lysis at sites where damage has occurred.

When DNA is in good condition, it has a highly organized association with matrix proteins in the cell nucleus. When damaged, this organization is interrupted. The single DNA strands losing their compact structure and relaxes, expanding out.

Human fibroblasts were treated with Vitamin C (Ethyl Ascorbic Acid) for 24 hours, and then exposed to 100 mM H<sub>2</sub>O<sub>2</sub>. It was shown that **Vitamin C** at concentrations of 5000 ppm and 10,000 ppm, **was able to protect DNA:**



## Vitamin C Mechanisms of action:



Vitamin C anti-aging action is exerted through several ways:

### **1. Synthesis and repair of dermal collagen**

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Deficiency of ascorbic acid (AA) produces significant alterations in connective tissue, since Vitamin C is essential for collagen synthesis.

Vitamin C is essential for the transformation of proline in hydroxyproline and lysine in hydroxylysine (essential constituents of collagen). Consequently Vitamin C offers stability to the extracellular matrix.

The local increase of vitamin C means therefore significantly promote collagen production; therefore improved skin elasticity and greater resistance in wall capillaries are assessed.

### **2. Antioxidant activity**

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Vitamin C protects cells from free radicals. From all the scientific publications regarding Vitamin C, the most interesting are those related to the photoprotective effect of ascorbic acid when topically applied.

The **Spanish Journal of Physiology** published a study showing how direct application of vitamin C protects, and thus prevents the aging in human skin cells in culture subjected to a strong oxidation stimulus with hydrogen peroxide. One might think that its photoprotective effect was physical, that is to say, topical vitamin C behaves as a sunscreen, and however, its absorption spectrum has nothing to do with the emission of UV radiation. Later it was found that UV radiation produced a significant decrease in the levels of ascorbic acid in the skin.

All this goes to show that the UV light, after exhausting all the vitamin C present in the skin, cause an increase in free radicals, making manifest the neutralizing action of vitamin C.

### 3. Anti-inflammatory action

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Vitamin C inhibits NFκB, which is responsible for the activation of a number of pro-inflammatory cytokines. Therefore, Vitamin C has a potential anti-inflammatory activity and can be used in conditions like acne vulgaris and rosacea. It can promote wound healing and prevent post-inflammatory hyperpigmentation.

### 4. Vitamin C as a whitening agent

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When choosing a whitening agent, it is important to differentiate between substances that are toxic to the melanocyte and substances that interrupt the key steps of melanogenesis. Vitamin C falls into the latter category of depigmenting agents. Vitamin C interacts with copper ions at the tyrosinase-active site and inhibits action of the enzyme tyrosinase, thereby decreasing the melanin formation<sup>1</sup>.

## Indications

VITAMIN C contains a combination of active ingredients that bring light and vitality to the skin, providing, immediately, a glowing and healthy look. It improves the texture and elasticity of the skin, homogenizes skin color and minimizes wrinkles and fine lines.

- ✓ Recovers the lost brightness and light as a result of the chronological aging, UV exposure (photoaging), as well as numerous aggressions to which our skin is exposed daily (pollution, cold, snuff, poor diet, lack of sleep, stress, ...).
- ✓ With continued treatment, it gets to **homogenize the skin tone** and reduce unwanted pigmentation.
- ✓ Helps **reduce wrinkles and fine lines** through the synthesis of collagen and elastin.
- ✓ **Increases skin firmness, smoothness and elasticity** and helps regenerate the dermal matrix by stimulating collagen synthesis.

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<sup>1</sup> Vitamin C in dermatology. Pumori Saokar Telang. Indian Dermatol Online J. 2013 Apr-Jun; 4(2): 143–146. doi: 10.4103/2229-5178.110593