

DAVOS  
LIFE SCIENCE



Natural e<sup>3</sup>  
DAVOS Tocotrienols

# Shine

## Under The Sun, Naturally

Tocotrienol For Cosmetics And Skincare

# Antioxidants That Go More Than Skin Deep

Since the dawn of time, mankind has found respite from the sun in the shade of tall trees. Today, the same trees that have withstood millennia of solar radiation as well as other environmental stresses are revealing to scientists their secrets of survival. The key to this protection from ultraviolet radiation and oxidative stress lies in the power of natural antioxidants.

Vitamin E is well-known for its anti-oxidative, healing and reparative properties, which helps to prevent skin aging and cancers. Recent studies, however, have found that Tocotrienol, a less common form of Vitamin E that occurs in plants such as oil palms, exhibit superior antioxidative activity compared to standard Vitamin E tocopherol.

A growing body of evidence also points to a promising future for Tocotrienol in high value dermatological products for protecting the body against free radicals that contribute to photo-aging and other skin damage such as cancer.

## What Is Tocotrienol?

Tocotrienol, along with tocopherol, are forms of Vitamin E. But differences in their chemical structure confer Tocotrienol vastly superior antioxidant properties with report of up to 60 times greater than tocopherol in a biological system and an Oxygen Radical Absorbance Capacity (ORAC) value 2.2 times greater than that of tocopherol.

The humble oil palm (*Elaeis guineensis*) is probably the richest source of natural Tocotrienol. Its fruits

contain the highest amounts of gamma and delta-tocotrienol, forms that exhibit the most potent levels of antioxidant activity. In comparison, rice bran has negligible quantities of delta-tocotrienol and is also very high in alpha-tocopherol, which is known to inhibit the beneficial effects of Tocotrienol.

## Tocotrienol And Skin Cancer

Overexposure to ultraviolet (UV) radiation as well as environmental pollution, smoke and stress generates an excessive number of free radicals, which increase the risk of skin cancer. Tocotrienol can play a role in preventing UV-induced skin cancer, as it has shown a superior ability compared to tocopherol to penetrate the stratum corneum (the outermost skin layer) and be retained within the skin tissue after topical application.

Tocotrienol is thought to help derail cancer formation at the cellular level, thanks to its ability to penetrate to the lowest and deepest layers of the skin, neutralising damaging free radicals and helping short-circuit the proliferation and spread of damaged cells.

Compared to tocopherol, Tocotrienol is also much more likely to be directed to the skin when applied.



## Natural Ingredients For Sun Protection And Skincare

Using state-of-the-art technologies, Davos Life Science isolates, concentrates and purifies Tocotrienol from palm oil to create Natural e<sup>3</sup>, a range of ingredients that deliver diverse and immense functionalities for human health and well-being. Natural e<sup>3</sup> Tocotrienol offers a trusted choice for manufacturers to design and market a new generation of cosmetics and skin care products.

# Feeling Good Under The Sun: How Tocotrienol Protects The Skin



## Tocotrienol & Photo-aging

Wrinkle formation or photo-aging takes place when unshielded skin is exposed to excessive sunlight. The resulting oxidative stress encourages the formation of collagenase, an enzyme that causes the degradation of collagen and elastin, structural proteins vital for skin strength and elasticity.

As a form of Vitamin E, Tocotrienol is able to inhibit collagenase over-expression in skin fibroblasts and thus support the latter's health and ability to produce collagen and elastin.

## Saving Your Skin For Sunny Days

Whether applied orally or topically, Tocotrienol offers much potential as natural antioxidants that help protect the skin from aging and UV damage after exposed to sun. Tocotrienol can be used in a range of skincare products, including:

- eye creams
- sunscreens
- face creams and lotions
- cleansers
- hand care products
- body care products
- lip care products
- hair care products

Regular application of Tocotrienol-rich formulas is recommended for an effective personal regime of skin protection and care. With fewer worries about the damaging effects of exposure to the sun, consumers can enjoy an active lifestyle and make the most of the long days of summer.

## Protection From Sunburn

Skin discoloration and pain from sunburn occurs when the body produces melanosomes that migrate to the skin's surface before being sloughed off.

Topically applied antioxidants have been shown to reduce the sunburn reaction and reduce skin damage by limiting UV ray damage to the epidermal layers. With their well-documented antioxidant activities, Tocotrienol thus has the potential to serve as a key ingredient in high SPF sunscreen products.

## Keeping Skin Moist

Topical application of Tocotrienol on the skin may also reduce water loss through the epidermis, maintain the skin barrier's lipid balance and strengthen the skin's barrier function. A human study has reported improved hydration of the skin's outer surface and enhanced water-binding capacity after topical application of Vitamin E. Another trial using products containing Tocotrienol, either singly or in combination with other ingredients, reported good efficacy in skin hydration enhancements and also increased skin hydration in tandem with treatment duration. Application of a Tocotrienol-rich moisturizer has also recorded lower Transepidermal Water Loss rates in a skin barrier function test.

## Hair Protection

Tocotrienol provides photoprotection for hair by scavenging free radicals that cause poor hair condition via oxidative damage, particularly after sun exposure. This helps to maintain the health and cosmetic value of the hair shaft.

# Tocotrienol

## At A Glance



- Superior antioxidant properties compared to Vitamin E tocopherol (ORAC value 2.2 times greater than tocopherol)
- Superior antioxidant properties (x60) in biological system compared to Vitamin E tocopherol
- Protects the body from damage by free radicals
- Radical skin protection factor (RSF) of 4.15
- Readily absorbed and easily penetrates into the lower skin tissue
- Protects the body from damage that can lead to skin cancer
- Helps prevent wrinkle formation and skin aging
- Soothes the skin from the effects of sunburn
- Maintains the skin's moisture and natural oil barrier
- Non-mutagenic and non-toxic, does not cause skin or eye irritation

### Davos Life Science: A World Leader In Tocotrienol Research And Applications

The world's leader in Tocotrienol, Davos Life Science owns and operates a state-of-the-art manufacturing facility in Singapore to produce top-grade natural Tocotrienol. Under the Natural e<sup>3</sup> brand, we offer both active single ingredients as well as signature formulations premixed for market-ready applications.

Our parent company, KLK Berhad, is a Malaysian conglomerate with 150,000 hectares of sustainable palm plantations managed to the highest quality and environmental standards. This assures Davos Life Science of a continuous supply of feedstock to support our clients worldwide.

### Supporting Our Customers With Science

We also operate the world's largest R&D centre for Tocotrienol, located near the Tuas Biomedical Park in Singapore. Manned by a team of senior scientists, this custom-build laboratory is equipped for advanced work in analytical chemistry, organic chemistry, biochemistry and cell biology. There is also a pilot lab to isolate and purify natural ingredients for bioactivity testing.

Our laboratory reviews, archives and offers access to the most current journals in chemical, biochemical and medical research on Tocotrienol and other valuable plant lipid extracts. We also provide technical support to help you communicate the latest science and benefits of natural Tocotrienol to your consumers.

*To learn about the functional properties of Natural e<sup>3</sup> Tocotrienol and its use in food and nutraceutical products, please contact us at:*

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