



DavosLife E3 Tocotrienols

FOR EVIDENCE-BASED HEALTH BENEFITS
BEYOND ANTIOXIDATION AND
ANTI-INFLAMMATION

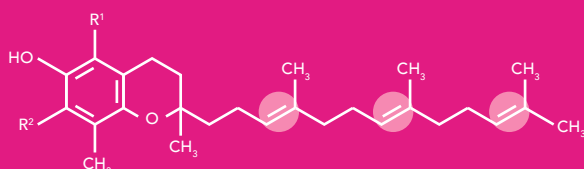


Tocotrienol, A Super Form of Vitamin E

Vitamin E is not just a single molecule, but a family of eight fat-soluble substances that are sub-divided into two classes of structurally-similar molecules. These two classes are tocopherol and tocotrienol, each of which have four structurally and chemically diverse molecules termed as alpha (α), beta (β), delta (δ), and gamma (γ) respectively.



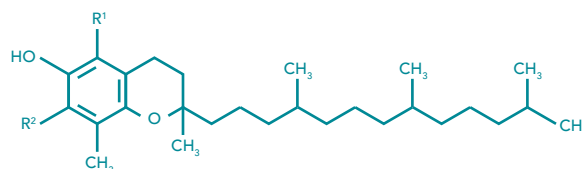
Tocotrienols have up to **60X more antioxidative potency** compared to α -Tocopherol, and have **unique anti-inflammatory properties** not seen in α -Tocopherol (Serbinova *et al.*, 1991).



TOCOTRIENOLS

Tocotrienols have unsaturated isoprenoid side chains with three double bonds. This unique property gives it better flexibility with a higher efficiency of penetrating into the cell membrane. Tocotrienols are potent **ANTIOXIDANTS*** with unique **ANTI-INFLAMMATORY** properties.

α : $R' = CH_3$, $R'' = CH_3$
 β : $R' = CH_3$, $R'' = H$
 γ : $R' = H$, $R'' = CH_3$
 δ : $R' = H$, $R'' = H$



TOCOPHEROLS

Tocopherols, in contrast, have saturated side chains. They also function as antioxidants, but this chemical structure gives them a lower antioxidative capacity as compared to tocotrienols.

α : $R' = CH_3$, $R'' = CH_3$
 β : $R' = CH_3$, $R'' = H$
 γ : $R' = H$, $R'' = CH_3$
 δ : $R' = H$, $R'' = H$

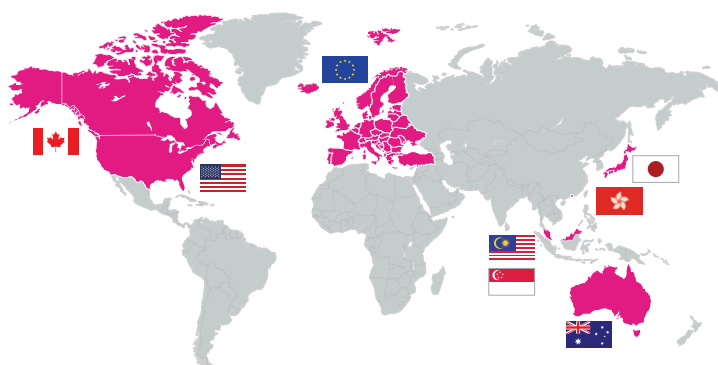
Tocotrienols have Unique Properties that Positively Impact Different Areas of the Body

Tocotrienols are naturally sourced from plant species like oil palm, rice and Annatto seed.

Each analogue of tocotrienol are functionally unique, with α -, β -, δ -, and γ -tocotrienol each exerting different beneficial effects on health and disease that are separate from the biological functions of α -tocopherol.



Countries that Recognise Tocotrienols as a Form of Vitamin E



Get to the Heart of the Matter: The Impact of Tocotrienol Supplementation on Cardiovascular Health

Having high cholesterol, high blood pressure, high triglycerides and diabetes lead to increased risk of cardiovascular disease. Clinical and pre-clinical studies have shown that tocotrienol supplementation is able to reduce the risk factors involved in cardiovascular disease.

High Cholesterol



20%

Total Cholesterol

25%

LDL

Supplementation with tocotrienol-rich fraction reduces total cholesterol and low-density lipoprotein (LDL) in humans (Qureshi *et al.*, 2002).

High Triglycerides



28%

Serum Triglycerides

Tocotrienol supplementation reduces serum triglycerides in humans (Zaiden *et al.*, 2010).

High Blood Pressure



160 mm Hg

19%

Systolic Pressure

30%

Diastolic Pressure

Tocotrienol supplementation gradually lowers systolic and diastolic blood pressure (Cheng *et al.*, 2017).

Diabetes

126 mg/dL

25%

Glucose Tolerance

50%

Insulin Tolerance

Tocotrienol supplementation improves glucose and insulin tolerance (Wong *et al.*, 2015).

Food for Thought: Tocotrienols and Brain Health

Cognitive decline can happen gradually, as is the case when a person ages or it can happen suddenly as is the case with ischemic stroke where there is a sudden loss of oxygen to the brain.

White Matter Lesions

White matter lesions (WML) are areas in white brain matter that appear hyperintense in MRI scans. The incidence of WML rises with age and they are linked to increased stroke risk and increased risk of developing dementia.

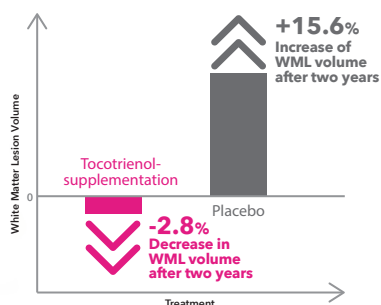
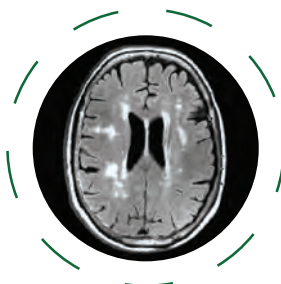


Figure 3: Changes in White Matter Lesion volume after two years of tocotrienol or placebo supplementation

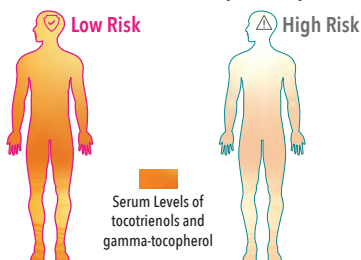


Clinical studies have shown that supplementation with tocotrienols could reduce the progression of white matter lesions (Gopalan et al., 2014).

Alzheimer's Disease and Mild Cognitive Impairment

Alzheimer's Disease is caused in part by the overproduction and lack of clearance of amyloid β protein ($A\beta$), accompanied by enhanced neuroinflammation.

Clinical evaluation of 140 subjects (≥ 65 years old)



Clinical trials have shown that high serum levels of tocotrienols and γ -tocopherol are correlated with a lower risk of getting Alzheimer's Disease and mild cognitive impairment (Mangialasche et al., 2013).

Stroke

When ischemic stroke happens, the sudden loss of oxygen to the brain results in brain cell death and inflammation.

Tocotrienol-supplemented canines had less damage to brain cells caused by stroke (Rink et al., 2011).

40%
Reduced Stroke Damage

Reduced Stroke Damage



Tocotrienol supplementation could stimulate the remodeling of existing blood vessels to immediately expand to supply oxygen to regions of the brain that need it when stroke happens (Rink et al., 2011).

Stand Tall: The Impact of Tocotrienols on Bone Health

Bone tissue is dynamic and constantly being remodeled in a balanced cycle of bone loss and bone formation. Bone diseases arise when this cycle goes out of flux and tips in favour of bone loss and inflammation.

How do Tocotrienols Maintain Bone Health?

In bone disease like osteoporosis, oxidative stress and inflammation lead to increased activity of osteoclast cells that promote bone tissue degradation. Pre-clinical studies have shown that tocotrienol supplementation reduces the amounts of oxidative stress in bone tissue, as evidenced by a reduced amount of bone lipid peroxidation marker (Figure 1) and increased amounts of antioxidative enzyme activity (Figure 2).

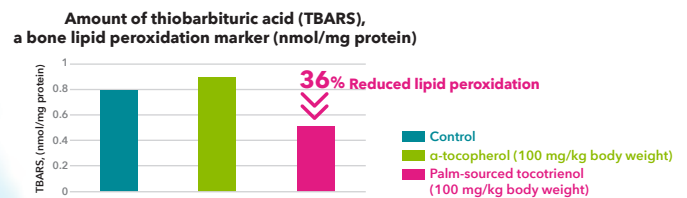


Figure 1: Impact of palm tocotrienol supplementation on lipid peroxidation in the femur of adult rats (Maniam et al., 2008)

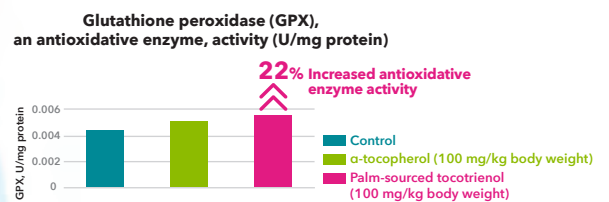
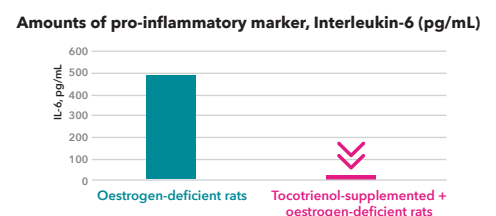
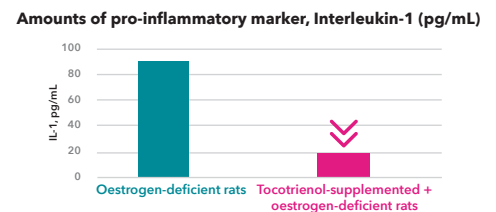


Figure 2: Impact of palm tocotrienol supplementation on antioxidative enzyme activity in the femur of adult rats (Maniam et al., 2008)

In menopause, oestrogen levels drop which leads to an increase in the amounts of pro-inflammatory cytokines like interleukin-1 (IL-1) and interleukin-6 (IL-6) in the body. This leads to low-grade chronic inflammation that further drives osteoclast cell-mediated bone tissue degradation. Pre-clinical studies have found that tocotrienol supplementation is able to prevent this rise in cytokines (Figures 3 and 4).



Tocotrienols and Liver Health

Non-Alcoholic Fatty Liver Disease (NAFLD) occurs when excess fat is stored in the liver, and is most commonly associated with obesity and metabolic syndrome.

Metabolic overload causes stress reactions in the liver, including oxidative stress and inflammatory pathways. Complications of the disease include liver fibrosis, cirrhosis, and liver cancer, with progressive cases requiring liver transplants. Clinical trials have proven that tocotrienol supplementation can protect the liver from non-alcoholic fatty liver disease.

Improves Liver Health Biomarkers

≈ 11%

Reduction of
Triglycerides²

≈ 14%

Reduction of
**Oxidative
Stress Marker
Malondialdehyde**²

≈ 18%

Reduction of
**Inflammatory
High-Sensitivity
C-Reactive Protein**²

≈ 16%

Reduction of
**Serum
Aminotransferases**²

Improves Liver Pathophysiology

≈ 50%

Patients that had
**Lowered Model
for End-stage
Liver Disease
(MELD) Score**³

≈ 57%

Reduction of
Liver Stiffness⁴

≈ 69%

Patients with
**Improved Liver
Imaging Test Results
after Supplementation**⁵

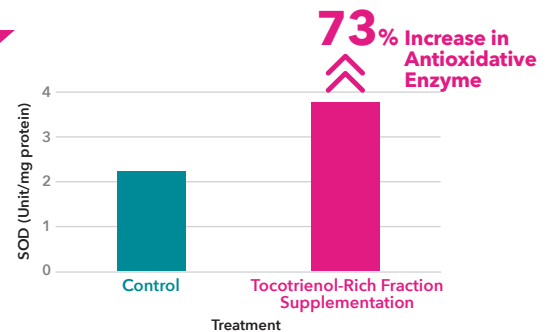
Maintain Peak Performance: How Tocotrienols Impact Exercise Endurance

During exercise, muscles contract to create movement and oxidative stress in muscle tissues increases. To counter the harmful effects of oxidative stress, the body produces antioxidant enzymes like superoxide dismutase.

Tocotrienols Enhance the Antioxidant Capacity of Muscle Tissues

Figure 1: Concentrations of SOD in muscle tissue (Lee et al., 2009).

Concentrations of superoxide dismutase (SOD) after maximal swimming exercise in muscle tissue

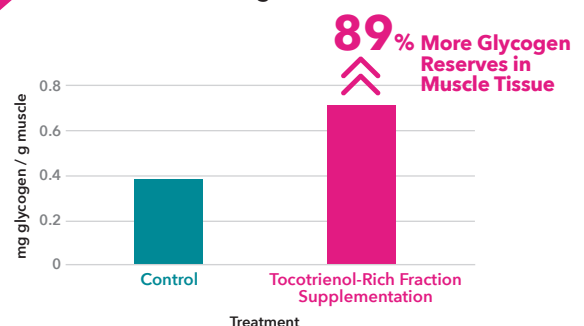


Glycogen reserves reduce during exercise, causing insufficient energy supply or oxygen to the muscles. This induces muscle fatigue.

Tocotrienols Maintain Glycogen Levels in Muscle Tissue

Figure 2: Concentrations of glycogen in muscle tissue (Lee et al., 2009).

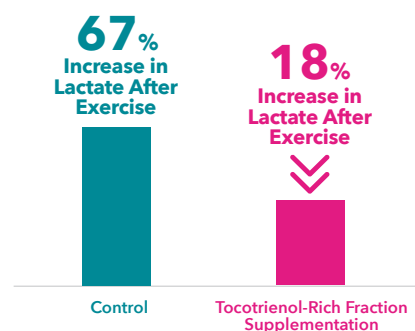
Concentrations of glycogen after maximal swimming exercise in muscle tissue



Exercise also induces an increase in lactate in muscle tissues as a by-product of anaerobic respiration. High lactate levels increase the acidity of muscle tissue and slows its capacity for more work.

Tocotrienols Reduce The Amount of Lactate Produced After Exercise

Figure 3: Concentrations of blood lactate in all groups after swimming exercise (Lee et al., 2009).



DavosLife E3 Tocotrienols Increase Skin's Resilience to Modern Pollution

Skin exposure to modern pollution has increased due to both artificial light from digital devices and air pollution from industrial and urban activities.

Urban Pollution

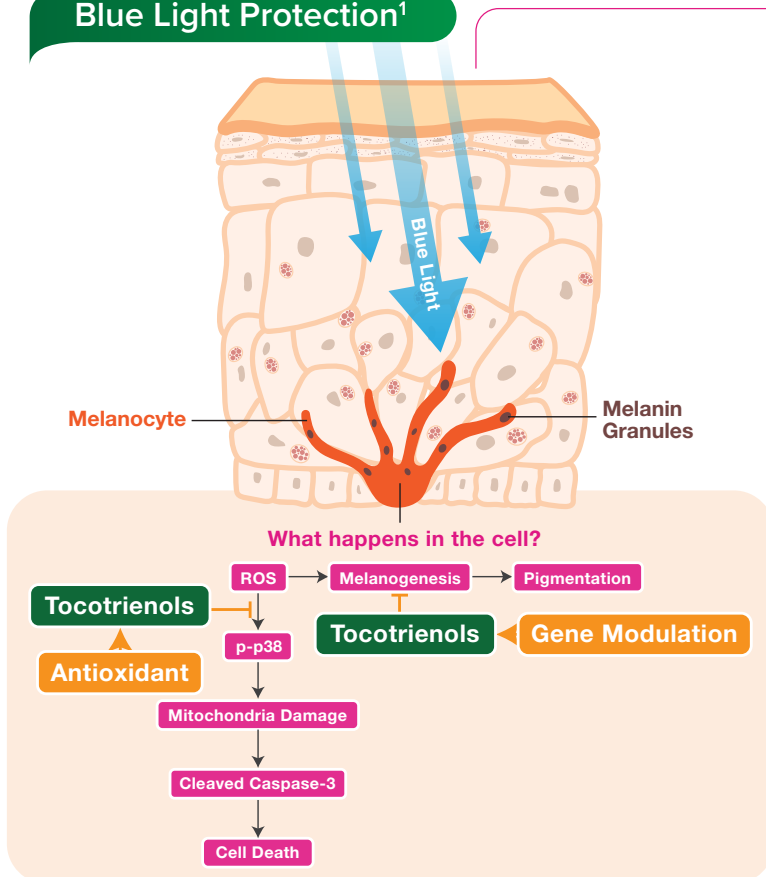
- ☹️ **Generates oxidative stress and inflammation**
- ☹️ **Accelerates skin ageing**
- ☹️ **Reduces elasticity**
- ☹️ **Induces hyperpigmentation**
- ☹️ **Weakens skin barrier**

Blue Light Exposure



DavosLife E3 Tocotrienols

Blue Light Protection¹



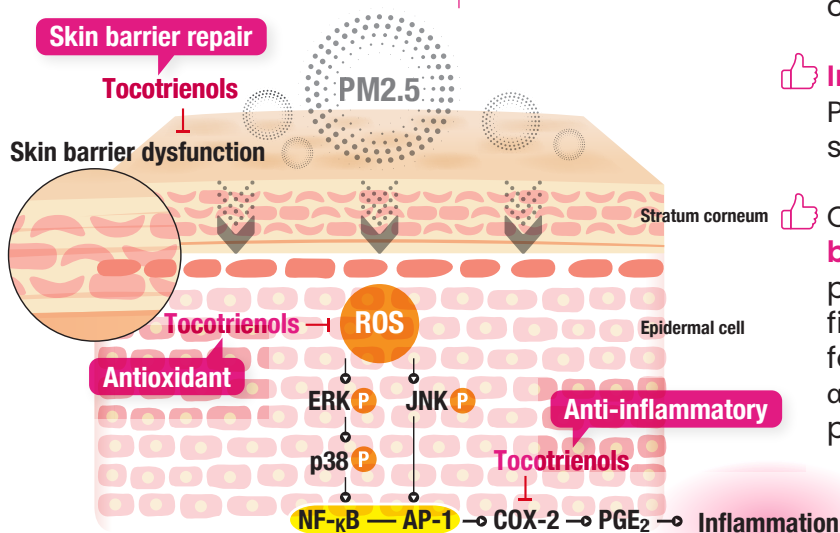
👍 **Effectively suppressed oxidative stress** and preserved the mitochondrial membrane potential

👍 **Reduced skin cell death** by reducing activation of the p38 mitogen-activated protein kinase molecule and **downregulating the expression** of cleaved caspase-3

👍 **Modulated tyrosinase activity**, resulting in reduced melanin production

👍 **Tocotrienols protect B16-F1 cells** against skin damage and pigmentation caused by blue light exposure but alpha-tocopherol does not.

Pollution Shield²



👍 **Inhibited PM2.5-induced oxidative stress** and was more effective compared to α-Tocopherol

👍 **Inhibited inflammation** caused by PM2.5 exposure, a property not shared by α-Tocopherol

👍 Could potentially **restore skin barrier function**, by increasing protein expression levels of filaggrin, involucrin and TGM-1, following exposure to PM2.5. α-Tocopherol does not share this property

Accreditations



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