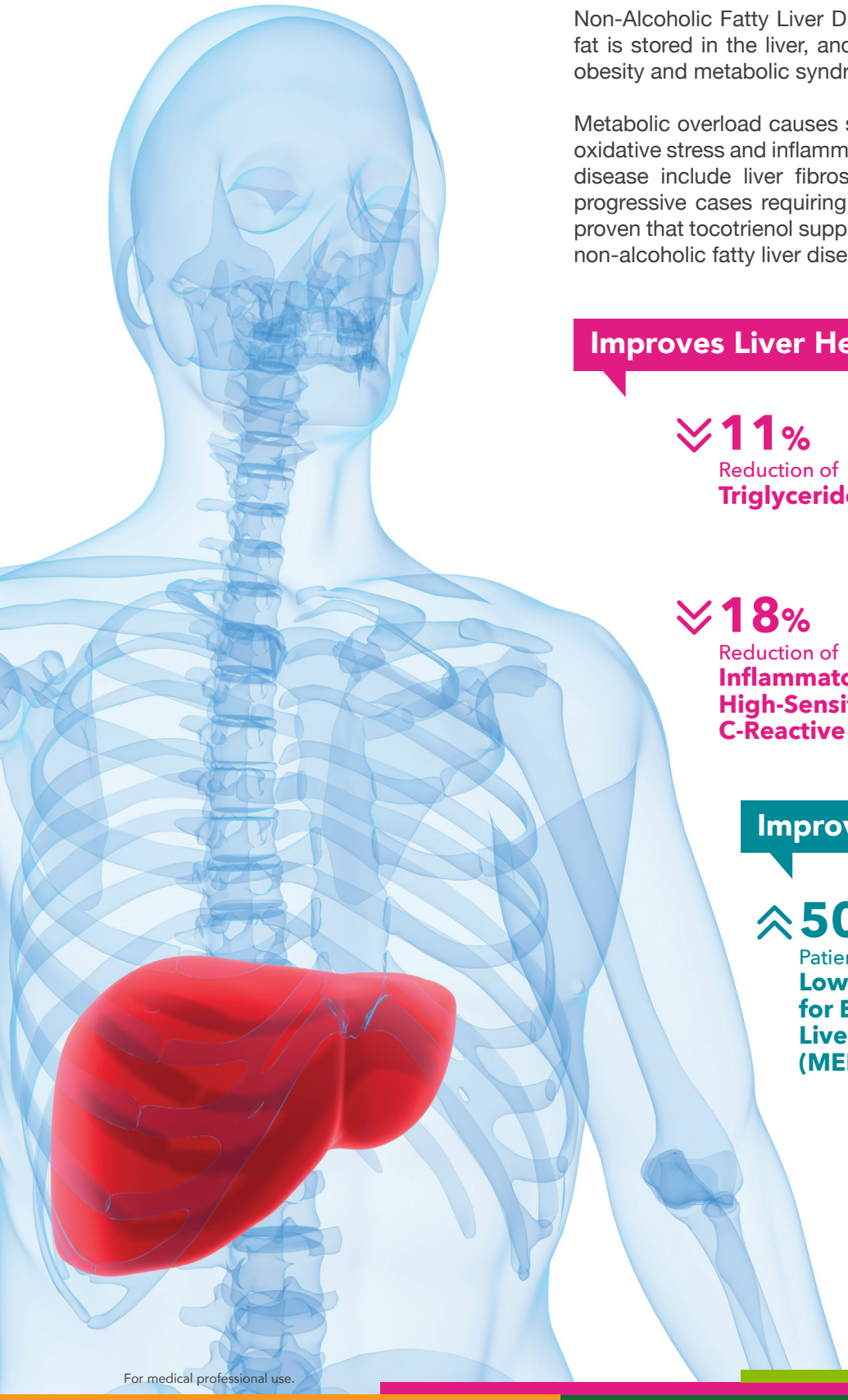
Tocotrienols and Liver Health



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 **Triglycerides**[2]

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 Stiffness**[4]

69% Patients with **Improved Liver Imaging Test Results after Supplementation**[5]

For medical professional use.

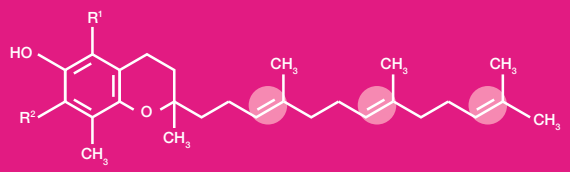
References:

1. Serbinova *et al.* (1991). *Free Radical Biology and Medicine*, 10: 263 – 275.
2. Pervez *et al.* (2018). *Turk J. Gastroenterol*, 29: 170 – 6
3. Patel et al. (2012). *J. Nutr.*, 142 (3): 513 – 9
4. Arguillas *et al.* (2013). *APAS Liver Week*, Singapore.
5. Magosso *et al.* (2012). *AASLD The Liver Meeting*, USA.

Tocotrienols, The Extraordinary 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.

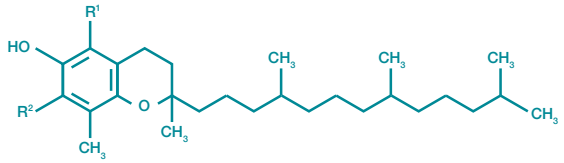
Tocotrienols have up to
60X more antioxidative potency
compared to α-Tocopherol, and have
unique anti-inflammatory properties
not seen in α-Tocopherol[1].



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.

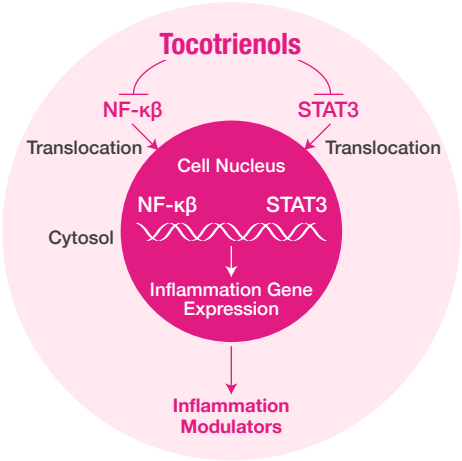
α : $R' = CH_3$, $R'' = CH_3$
β : $R' = CH_3$, $R'' = H$
γ : $R' = H$, $R'' = CH_3$
δ : $R' = H$, $R'' = H$

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.

Potent Anti-Inflammatory Agent



Tocotrienols have pronounced and potent effects on NF-κβ (key master regulator of inflammation) and STAT3 (master inflammatory transcriptional factor) to reduce inflammation[2,3,4].

Reference:
1. Serbinova, E., Kagan, V., Han, D., and Packer, L. (1991). Free radical recycling and intramembrane mobility in the antioxidant properties of alpha-tocopherol and alpha-tocotrienol. Free Radical Biology and Medicine, 10: 263 – 275.
2. Guang et al. (2015). Am J Transl Res;7(9): 1612-1620
3. Ng et al. (2012). Food Chemistry; 134: 920–925
4. Aggarwal et al. (2010). Biochem Pharmacol.; 80(11): 1613–1631.

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