



Tocotrienols – Superheroes for Cholesterol and Beyond:

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Tocotrienols-It's a mouthful. But very well worth repeating, and better yet, well worth using as a supplement. If you have had problems with stubborn high cholesterol, maybe it's time to look at a nutrient that is touted in the research for its many benefits. Read below on how the studies are showing that Tocotrienols (part of the vitamin E molecule) are believed to:

- **Reduce Total Cholesterol***
- **Reduce LDL (the bad) Cholesterol (over 40% in some studies; 90% in cell studies!)***
- **Reduce Triglycerides***
- **Reduce Apo B***
- **Improve the HDL Profile ***
- **Increase Coenzyme Q 10 levels (up to 300 %!)***

Tocotrienols are blasting ahead in cholesterol research studies! In addition to lowering total cholesterol and LDL cholesterol, improving HDL/LDL ratios, reducing triglycerides, and reducing apolipoprotein B, the Tocotrienols actually increase Coenzyme Q 10 as much as 300%! The biggest nutrient depletion of statins is Coenzyme Q 10, an important stand alone heart nutrient. The Tocotrienols down regulate the cholesterol synthesis enzyme. This is why the statins are effective at lowering cholesterol, however Tocotrienols don't deplete Co Q 10 like the statins, in fact, they **increase the biosynthesis of endogenous Co-Q 10!**

In a randomized, double blind, placebo-controlled design involving 19 type 2 diabetic subjects with hyperlipidemia, Tocotrienols reduced the LDL (bad) cholesterol from an average of 179 mg/dl to 104 mg/dl, that's more than 40%!!!¹ Tocotrienols has stormed the literature lately with reports that they have effective health benefits, many of which have never been attributed to the "alpha tocopherol" portion of the molecule (the most popular vitamin E supplement). Tocotrienols (alpha, beta, gamma and delta) not only increase synergy amongst themselves, they exhibit outstanding health qualities above and beyond alpha tocopherol!

In another trial, ninety hypercholesterolemic human subjects participated in a study which comprised three phases of 35 days each. The subjects were initially placed on the American Heart Association (AHA) Step-1 diet and the effects noted. They were then administered 25, 50, 100, and 200 mg/day of a Tocotrienols-rich supplement while on the restricted (AHA) diet. The

results showed that a dose of 100 mg/day of the supplement produced the maximum decreases of 20, 25, 14 (P<0.05) and 12%, respectively, in serum total cholesterol, LDL-cholesterol, apolipoprotein B and triglycerides compared with the baseline values, suggesting that a dose of 100 mg/day of Tocotrienols plus AHA Step-1 diet “may be the optimal dose for controlling the risk of coronary heart disease in hypercholesterolemic human subjects”. (Qureshi AA et al.)

So, we know that Tocotrienols are hitting it out of the park in a lot of health arenas, but let’s focus on cholesterol, because many people are on statins to decrease their cholesterol, and because Lipitor is one of the major selling drugs of all time. While a lot of the spotlight has been on lowering cholesterol, oxidized cholesterol has loomed as a factor and maybe even a much bigger player than levels of cholesterol alone. Fortunately, the Tocotrienols have potent antioxidant power.

Some of the other outstanding qualities of the Tocotrienols **include heart protection, improved exercise endurance, inflammation support, immune support, anti-aging support, antioxidant support, and hormone support**....and the list goes on.² Tocotrienols are even being studied in the field of cancer.³ In the area of diabetes, research shows that Tocotrienols are of great benefit, including reducing diabetes-induced general tissue damage, cognitive impairment, nephropathy, blood glucose and glycated hemoglobin, in addition to “**reducing the risk for getting diabetes**”!⁴ Dietary supplementation studies have established that Tocotrienols, fed orally, do reach the brain. In fact, “The current findings point towards Tocotrienols as a **potent neuroprotective form** of natural vitamin E”.⁵

So, the Tocotrienols are outperformers when it comes to health conditions, and again, are proving very promising in the area of cholesterol concerns. The biggest reason cholesterol is such a concern is because of the risk for heart disease, and several studies suggest that the Tocotrienols are very **cardio protective**. One study even rated the Tocotrienols as to their cardio protective power, and found that, “The gamma-isoform of Tocotrienols was the most cardio protective of all the isomers followed by the alpha- and delta-isoforms”⁶ “**Tocotrienols attenuate myocardial ischemia-reperfusion injury, atherosclerosis, and reduced ventricular arrhythmias**”, in addition to the fact that “Tocotrienols-mediated cardio protection is also achieved through the preconditioning-like effect, the best yet devised method of cardioprotection”⁷ Additionally, while it is known that high dose (1200 IUs or more) of alpha tocopherol may have adverse effects on blood pressure because it lowers the levels of synergistic components like Tocotrienols, the Tocotrienols appear to have a favorable effect on blood pressure.⁸

The Tocotrienols are all powerful, and they work together synergistically to accomplish all the benefits described in the literature. For a more detailed description of some of the health benefits of the Tocotrienols, please ask for a copy of the latest issue of the Nutri-Notes, “**Vitamin E – the Versatile Nutrient.**”

* Qureshi, AA. et al. Dose-dependent suppression of serum cholesterol by tocotrienol-rich fraction (TRF25) of rice bran in hypercholesterolemic humans. *Atherosclerosis*. 2002 Mar;161(1):199-207; Bentinger M, et al. Polyisoprenoid epoxides stimulate the biosynthesis of coenzyme Q and inhibit cholesterol synthesis. *J Biol Chem*. 2008 May 23;283(21):14645-53.

1. Baliarsingh S, et al. *Atherosclerosis*. 2005 Oct;182(2):367-74).
2. Enioutina EY, et al. Enhancement of common mucosal immunity in aged mice following their supplementation with various antioxidants. *Vaccine*. 2000 May 8;18(22):2381-93; Ajuluchukwu JN, et al. Comparative study of the effect of tocotrienols and -tocopherol on fasting serum lipid profiles in patients with mild hypercholesterolemia: a preliminary report. *Niger Postgrad Med J*. 2007 Mar;14(1):30-3; Wu SJ, et al. Tocotrienol-rich fraction of palm oil exhibits anti-inflammatory property by suppressing the expression of inflammatory mediators in human monocytic cells. *Mol Nutr Food Res*. 2008 Aug;52(8):921-9; Kuhad A, Chopra K. *Life Sci*. 2009 Feb 27;84(9-10):296-301; Kuhad A, et al. *Pharmacol Biochem Behav*. 2009 Apr;92(2):251-9; Lee SP, Mar GY, Ng LT. Effects of tocotrienol-rich fraction on exercise endurance capacity and oxidative stress in forced swimming rats. *Eur J Appl Physiol*. 2009 Nov;107(5):587-95.
3. Agababa D. Design and QSAR study of analogs of gamma-tocotrienol with enhanced antiproliferative activity against human breast cancer cells. *J Mol Graph Model*. 2009 Apr;27(7):777-83; Hussein D, Mo H. *Pancreas*. 2009 May;38(4):e124-36.
4. Wan Nazaimoon WM, Khalid BA. *Malays J Pathol*. 2002 Dec;24(2):77-82; Montonen J, et al. *Diabetes Care*. 2004 Feb;27(2):362-6.
5. Sen CK, Khanna S, Roy S. Tocotrienol: the natural vitamin E to defend the nervous system? *Ann N Y Acad Sci*. 2004 Dec;1031:127-42.
6. Das S, et al. *Am J Physiol Heart Circ Physiol*. 2008 Feb;294(2):H970-8.
7. Das S, et al. Tocotrienols in cardioprotection. *Vitam Horm*. 2007;76:419-33.)
8. Rasool AH et al. Arterial compliance and vitamin E blood levels with a self emulsifying preparation of tocotrienol rich vitamin E. *Arch Pharm Res*. 2008 Sep;31(9):1212-7.