

“To E Or Not To E”

EAST Meets WEST - THE YIN & YANG OF VITAMIN E



WH LEONG, Vice President; Carotech Inc

“Is vitamin E suddenly a pariah with potentially adverse side effects?”, “Should I continue to take vitamin E?” and “What form of vitamin E should I take?”. These are the questions asked by many as a result of the recent media and scientific reports.

Vitamin E was, until recently, viewed as the most promising supplement in preventing or at least reducing, the risk of free-radical mediated degenerative diseases. What actually happened?

On July 6th 2005, the *Journal of American Medical Association (JAMA)* published the much-awaited vitamin E results of the longest and largest human trial conducted on vitamin E, The Women’s Health Study (WHS)¹. WHS was conducted from 1992 to 2004 involving nearly 40,000 healthy women. Quite unexpectedly, the data from this largest trial indicated that 600 IU of natural-source vitamin E (d-alpha-tocopherol) taken every other day provided no overall benefits for major cardiovascular events or cancer.

Prior to this latest publication, there were two other negatives studies on vitamin E - the Heart Outcomes Prevention Evaluation study (HOPE-TOO) in *JAMA*, March 2005 and Johns Hopkins’ Vitamin E Meta-Analysis, in the *Annals of Internal Medicine*, November 2004^{2,3}. Refer to my previous *Technical Communication* for details on these publications.

As usual, the media took advantage of and sensationalize these negative results. Hence, the confusion among the consumers who take vitamin E for its health benefits. For those who have been following meteoric rise (and now fall) of vitamin E as a nutrient par excellence, these results are both untimely and of major concern. The backlash will definitely be felt and resulting in consumers backing off in droves.

However, all is not doomed. There is a silver lining in all these confusion and negative media news. It is time for the “real” vitamin E to emerge and be brought to the forefront as well as attention of consumers alike.

The subject itself needs re-examination since the present debacle was precipitated by using a single form of vitamin E (ie : alpha-tocopherol). In the above three studies, participants were supplemented with a single form of vitamin E (ie : alpha-tocopherol alone). There are two major flaws with this form of vitamin E – i) that it is not so natural after all and ii) vitamin E should be taken as a wholesome mixture of d-mixed tocopherols and d-mixed tocotrienols – all the 8 forms of vitamin E as produced in nature.

Allow me to explain :-

- i) **Vitamin E products currently available on the shelves of health food stores consist mainly of d-alpha-tocopherol alone. However, in nature – soybean, the main source for tocopherol extraction, consists of a natural mixture of tocopherols – d-alpha, d-beta-, d-gamma and d-delta-tocopherol, with d-gamma-tocopherol as the predominant form of tocopherol in soybean.**

In order to obtain d-alpha-tocopherol alone (since it has the highest IU of vitamin E activity), the original natural mixture of tocopherols is subjected to a synthetic and chemical process called methylation, where d-beta, gamma and delta tocopherol (so called “non-alpha tocopherol”) are converted to d-alpha tocopherol as a single isomer/form. What this means to consumers is that their “natural” vitamin E product with a single form of d-alpha-tocopherol is not “natural” after all.

The best way to supplementation is mimicking nature – taking what is produced in nature in its natural form. This leads me to the 2nd flaw.

- ii) **In nature, there are 8 forms of vitamin E⁴ Taking a single form of vitamin E (ie : alpha-tocopherol alone) denies the very fact that nature put seven (7) other forms on vitamin E (ie : gamma-tocopherol, beta-tocopherol, delta-tocopherol, alpha-tocotrienol, beta-tocotrienol, gamma-tocotrienol and delta-tocotrienol) out there for a reason.**

In foods, alpha- and gamma-tocopherol account for most of the vitamin E activity. While tocopherols are generally present in common vegetable oils (i.e. soy, canola, wheat germ, sunflower), tocotrienols, on the other hand, are concentrated in cereal grains (ie. oat, barley, and rye, rice bran), with the highest level found in crude palm oil. It is unfortunate that not many consumers are aware of tocotrienols due to the low level in the Western diets

Other forms of vitamin E - gamma-tocopherol, delta-tocopherol and certainly tocotrienols have been proven to have unique and additional health properties not associated to alpha-tocopherol within the body.

Recent scientific publications revealed the unique health benefits associated with non-alpha tocopherol such as gamma-tocopherol and delta-tocopherol⁵ High dosage of alpha-tocopherol alone has been shown to deplete the body's gamma-tocopherol. Despite alpha tocopherol's action as an antioxidant, gamma tocopherol is required to effectively remove the harmful peroxynitrite-derived nitrating species⁶. Because large doses of dietary alpha tocopherol displace gamma tocopherol in plasma and other tissues, the current wisdom of vitamin E supplementation with primarily alpha tocopherol alone should be called into question.

Tocotrienols on the other hand have been proven to be beneficial to the cardiovascular health. It is a more potent antioxidant (40-60 times more potent) and has been proven to lower total blood cholesterol as well as reverse arterial blockage in Carotid Stenosis patients ^{7,8,9,10,11}. In a recent NIH-funded study in collaboration with Ohio States University Medical Center and Carotech Inc, it was found that Tocomin[®] natural full spectrum palm tocotrienol complex especially alpha-tocotrienol was the most potent among the tocotrienols and is much more potent than tocopherol, in protecting the brain from glutamate-induced neuro-degeneration ^{12,13,14, 15}.

In summary, taking a single form of vitamin E (ie : alpha-tocopherol - synthetic or natural) is not the panacea. It is against conventional wisdom to take mega-doses of one nutrient without considering the potential side effects.

Looking at the totality of vitamin E research for the past 85 years, it is prudent to take the wholesome full spectrum vitamin E : d mixed tocopherols + d-mixed tocotrienols - as what is produce and found in nature. As mentioned, mimicking nature is the best way for supplementation. Like the carotenoids and vitamin B complex, all these different forms of vitamin E work synergistically and depend on each other for optimum functionality.

The major form of vitamin E in the western diet occurs in the form of gamma-tocopherol because of abundance of soy and corn derived products. On the other hand, in the Eastern diet, the major form of vitamin E is that of gamma-tocotrienol from palm oil and rice derived products.

Hence, merging of the “East and West” is the best way for vitamin E supplementation. It is the “Yin & Yang” of Vitamin E – getting the best of both worlds.

A Complete Vitamin E supplement should consist both the mixed tocopherols (with the ratio of gamma tocopherol : alpha tocopherol as 2.5 : 1 to 4 : 1) and mixed tocotrienols (20 - 40mg). Carotech’s Tocomin[®] natural palm tocotrienol complex is the only tocotrienol source that provides all the four forms of tocotrienol in significant level

Last but not least, natural phytonutrients just don't work well in isolation from each other. It is prudent to take a full spectrum Vitamin E supplement that consists of d-mixed tocopherols + d-mixed tocotrienols. And it would be safer than just the alpha-tocopherol or mixed tocopherol alone.

Thank you

**WH Leong
Vice President
Carotech Inc
Email : carot3@aol.com**

Only Tocomin[®] Natural Palm Tocotrienol Complex provides all the 4 isomers of tocotrienol (alpha-, beta-, gamma and delta-tocotrienol) in significant level. Other tocotrienol sources are not a full spectrum tocotrienol complex.

Carotech Inc - The Leading & Largest Supplier of Full Spectrum Tocotrienol Complex In The World

Carotech - Your Preferred Partner in Nutraceutical Excellence

Resource Information for Vitamin E (Tocopherols + Tocotrienols)

Tocotrienol Educational Website : www.tocotrienol.org

CRN's Resource Website for Vitamin E : <http://www.crnusa.org/vitaminEissafe.html>

NNFA's Resource Website for Vitamin E : <http://www.nnfa.org/vitamine.htm>

Scientific References :-

1. I-Min, Lee, *et al.*, "Vitamin E in the primary prevention of cardiovascular disease and cancer", *JAMA*, 2005; 294 (1) : 56-65.
2. Lonn, Eva, *et al.*, "Effects of long-term vitamin E supplementation on cardiovascular events and cancers", *JAMA*, 2005; 293 (11) : 1338-1347
3. Miller, ER, *et al.*, "Meta-Analysis – High dosage vitamin E supplementation may increase all-cause mortality", *Ann. Intern. Med*, 2005; 142 : 37 – 46.
4. Dial S, Eitenmiller RR, "Tocopherols and tocotrienols in key foods in the US diet", In : *Nutrition, Lipids, Health and Disease*, Ed : Ong ASH, Niki E, Packer L, AOCS Press, Champaign IL, 1996.
5. Handelman *et al.*, "Oral alpha-tocopherol supplements decrease plasma gamma-tocopherol levels in human", *Journal of Nutrition*, 1985; 115(6) : 807-813.
6. Cooney RV, Franke AA, Harwood PJ, Hatch-Pigott V, Custer LJ, Mordan LJ., "γ-Tocopherol detoxification of nitrogen peroxide: Superiority to α-tocopherol", *Proc Natl Acad Sci USA*. 1993; 90: 1771-1775.
7. Tomeo AC, Geller M, Watkins TR, Gapor A, and Bierenbaum ML. "Antioxidant effects of tocotrienols in patients with hyperlipidemia and carotid stenosis". *Lipids* 1995; 30: 1179-1183.
8. Bierenbaum ML, *et al.*, "Palm oil antioxidant effects in patients with hyperlipidaemia and carotid stenosis – 2 year experience", *Asia Pacific J. of Clinical Nutrition* 1997; 6(1):72-75.
9. Serbinova E, Khwaja S, Catudioc J, *et al.* "Palm oil vitamin E protects against ischemia/reperfusion injury in the isolated perfused Langendorff heart". *Nutr Res* 1992; 12: S203-S215.
10. Qureshi AA, Bradlow BA, Brace L, *et al.*, "Response of hypercholesterolemic subjects to administration of tocotrienols". *Lipids* 1995; 30: 1171-1177.

11. Khor HT, *et al.*, “Effect of a palm oil vitamin E concentrate on the serum and lipoprotein lipids in humans”, *American Journal of Clinical Nutrition*, 1991; 53 : 1027S – 1030S.
12. Sen CK, Khanna S, Roy S, Packer L., “Molecular basis of vitamin E action: Tocotrienol potently inhibits glutamate-induced pp60^{c-Src} kinase activation and death of HT4 neuronal cells”, *J Biol Chem* 2000; 275 : 13049-13055.
13. Sen CK, *et al.*, “Molecular Basis of Vitamin E Action - Tocotrienol modulates 12-lipoxygenase, a key mediator of glutamate-induced neurodegeneration”, *J. Biol. Chem.*, 2003; 278 (447) : 43508-43515.
14. Sen, Chandan, *et al.*, “Vitamin E sensitive genes in the developing rat fetal brain : a high density oligonucleotide microarray analysis”, *FEBS Letter*, 2002; 530 : 17-23
15. Sen, Chandan, *et al.*, “Tocotrienol: the natural vitamin E to defend the nervous system?”, *Annals of the New York Academy of Science*. 2004; 1031 : 127-42

The above statement has not been evaluated by the Food and Drug Administration. It is not intended to diagnose, treat, cure or prevent any disease.