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Report

## Critical Importance of Gamma E Tocopherol Continues to Be Overlooked

By Kirk Stokel

In 1997, the **Life Extension Foundation**® warned that taking only the *alpha tocopherol* form of vitamin E could displace critically important gamma tocopherol in the body.

While alpha tocopherol inhibits the production of new free radicals, *gamma tocopherol* is required to trap and neutralize existing free radicals.



Three years after Life Extension's announcement, the **Johns Hopkins School of Public Health** released the results of a huge study (10,456 men). The startling findings showed that men with the highest *gamma tocopherol* blood levels had a five-fold reduction in prostate cancer risk. This same study showed that selenium and alpha tocopherol also reduced prostate cancer risk, but only when gamma tocopherol levels were high.<sup>1</sup>

Over the last 13 years, a myriad of studies have pointed to the urgent need for Americans to obtain sufficient *gamma tocopherol*. Yet the vast majority of human clinical research focuses only on **alpha tocopherol** —as if it were the only form of vitamin E people require.

This article uncovers new research showing the ability of *gamma tocopherol* to combat conditions as diverse as asthma, cancer, metabolic syndrome, cardiovascular conditions, Alzheimer's, and Parkinson's disease.

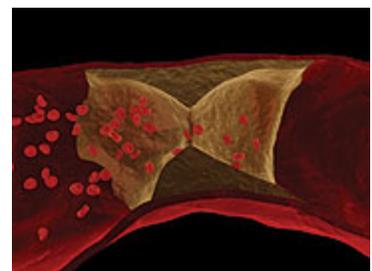
### Differences Between Alpha and Gamma Tocopherol

Alpha tocopherol is the best known form of vitamin E and is found in the largest quantities in blood and tissue. It is critical, however, for anyone supplementing with vitamin E to make sure they are also getting adequate gamma tocopherol each day.

The key benefit is gamma tocopherol's ability to dramatically reduce inflammatory threats, a major cause of virtually all degenerative diseases. Current research supports the importance of gamma tocopherol in preventing numerous components of the degenerative diseases associated with aging.<sup>2,3</sup>

Although little known to the general public, gamma tocopherol is the form of vitamin E most prevalent in our natural diets. In addition to its impressive antioxidant capacity, gamma tocopherol possesses key functions critical to our well-being.<sup>4,5</sup> It is now recognized that gamma tocopherol, like alpha tocopherol, is retained in the body and delivered to tissues.<sup>6</sup>

Gamma tocopherol has far more powerful anti-inflammatory actions than does the alpha form. Further, it is more potent at inhibiting certain inflammatory cytokines in cell culture and in living animals.<sup>7-9</sup> And it inhibits production of stress-related "heat shock proteins" that result from inflammatory stimuli.<sup>10</sup> Kidney dialysis patients, with huge inflammatory stresses, show reduced markers of inflammation when supplemented with gamma tocopherol.<sup>11</sup>



[Atherosclerosis](#)

# Enhanced Protection Against Atherosclerosis

Cardiovascular diseases are now recognized as the result of oxidative stress and inflammation at every stage. Gamma tocopherol is gaining the attention of cardiovascular scientists and clinicians because of its unique ability to block inflammation and to induce favorable changes in blood vessel function.

As researchers now know, it is the *oxidation* of LDL that makes it such a dangerous atherogenic lipid in the blood. In a study comparing the effects of gamma vs. alpha tocopherol in preventing oxidation of LDL, scientists found that it was the gamma tocopherol that provided potent protection in every parameter.<sup>12</sup>

One of the most important benefits of gamma tocopherol is its ability to improve *endothelial function* by increasing *nitric oxide synthase*, the enzyme responsible for producing vessel-relaxing **nitric oxide**.<sup>12</sup> One major way it produces this effect is by sponging up destructive reactive nitrogen species, such as peroxynitrite.<sup>13</sup> In fact, gamma tocopherol is able to “trap” a variety of reactive nitrogen species and halt their negative effects on a host of cellular processes.<sup>14</sup>

The cumulative effect of all of these actions was shown in a study demonstrating that gamma tocopherol could prevent cerebral infarction (the most common type of stroke) in a mouse model.<sup>15</sup>

Supplementation in humans with only **100 mg per day** of gamma tocopherol showed similar promise, demonstrating a reduction in several risk factors for arterial clotting such as platelet aggregation and LDL cholesterol.<sup>16</sup>

Another study using a daily supplement containing **800 mg** of gamma tocopherol resulted in reduction of oxidative stress and inflammatory markers in adults with metabolic syndrome.<sup>3</sup> Interestingly, the effects were even more pronounced when 800 mg of alpha tocopherol was added, demonstrating that both forms of vitamin E are synergistically vital for optimal cardiovascular health.

Strenuous exercise, while beneficial for people in good physical shape, does tend to increase blood coagulation and platelet aggregation in sedentary individuals—a bad thing in people with pre-existing atherosclerosis. Gamma tocopherol supplementation can mitigate these effects, potentially lowering stroke and heart attack risk.<sup>17</sup>



## Anti-Cancer Effects

Just as we saw with cardiovascular disease, gamma tocopherol exerts anti-cancer effects through a variety of important mechanisms, giving it an especially broad spectrum of action against a host of tumor types. At the very beginning of the cancer development process, gamma tocopherol traps reactive nitrogen species and other free radicals that cause mutations in DNA strands and render cells vulnerable to malignant transformation.<sup>18,19</sup> This is a crucial step in the prevention of cancer.

Gamma tocopherol inhibits cancer cell growth in culture through a number of different mechanisms.<sup>20</sup> It down-regulates control molecules known as cyclins, which trap cancer cells in the midst of their reproduction cycle and prevent them from reproducing and spreading.<sup>21</sup> This anti-cancer effect appears to be based on a mechanism separate from the vitamin’s well-known antioxidant powers.

A cell membrane receptor called PPAR-gamma is a promising target for anticancer therapies because it affects genes that control cancer cell growth and death.<sup>22</sup> This is why PPAR-activating drugs are being researched and developed by pharmaceutical companies as anti-cancer drugs. Gamma tocopherol is more powerful than alpha tocopherol at stimulating PPAR-gamma activity, especially in colon cancer cells.<sup>23,24</sup> In prostate cancer cells, PPAR-gamma stimulation by gamma tocopherol resulted in a complete cessation of cancer cell growth.<sup>24</sup>

- Emerging data reveal that gamma tocopherol supplies potent protection against cardiovascular disease, cancer, and even neurodegenerative conditions.
- Gamma tocopherol has superior anti-inflammatory and gene regulatory activities, while alpha-tocopherol remains a potent antioxidant.

Once cancerous transformation has taken place, there are still biological opportunities to prevent full-blown tumor development. One of these ways is the induction of deliberate cell death through built-in genetic programs, a process called apoptosis. In a variety of cancer tissues, gamma tocopherol has been found to be superior to alpha tocopherol at inducing apoptosis, triggering a number of cell-death-inducing pathways.<sup>25,26</sup> In prostate cancer cells, gamma tocopherol induced cell death by blocking synthesis of important cell membrane components.<sup>27</sup> And gamma tocopherol also reduces the development of new blood vessel formation in tumors, depriving them of the nutrients they need to thrive.<sup>28</sup>

To date, all of these mechanisms have been shown to inhibit cancers of the colon, prostate, breast, and lung in animal models, with many more under active investigation.<sup>29</sup>

Human studies provide excellent confirmation of the unique chemoprotective effects of gamma tocopherol. A diet rich in walnuts, which contain gamma tocopherol (3 oz. contain 15.6 mg gamma tocopherol), produced a trend towards improvement in measurements of prostate-specific antigen (PSA)—a marker of prostate cancer.<sup>30</sup> Note that one would have to eat massive amounts of walnuts each day (almost 2.5 pounds) to obtain optimal gamma tocopherol dosing. This is why supplementation with gamma tocopherol is an important component of any prevention program.

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### Neurodegenerative Disease Defense

A particularly dangerous free radical known as *reactive nitrogen species* has been implicated in Alzheimer's disease. High intakes of vitamins C and E have been associated with substantially lower risk of age-related neurodegenerative diseases such as Alzheimer's.<sup>31,32</sup> Gamma tocopherol scavenges *reactive nitrogen species* and may prove beneficial in reducing the impact of the disease.<sup>33</sup>



Neurodegenerative diseases also have a large inflammatory component. Human trials of supplemental vitamin E in neurodegenerative diseases have almost exclusively used alpha tocopherol, leading many experts to call for new studies using gamma tocopherol because of its more potent anti-inflammatory effects.<sup>5</sup> In a mouse model of Parkinson's disease, gamma tocopherol was more effective than alpha tocopherol at preventing loss of the essential neurotransmitter dopamine, the chemical defect that produces Parkinson's symptoms.<sup>34</sup>

### Combating Inflammatory Airway Diseases: Allergies and Asthma

Asthma and allergies are closely related conditions that are triggered by our immune system going into red alert in response to substances in the environment. In numerous studies, gamma tocopherol prevents migration of inflammatory cells into the

airways at the beginning of an attack of asthma or allergic rhinitis, and also reduces overgrowth of mucous cells in the nose and upper airways.<sup>35</sup> Gamma tocopherol supplementation decreases overall oxidative stress and suppresses excessive release of inflammatory cytokines in both normal and asthmatic human subjects.<sup>36</sup>

Oxidant molecules such as ozone are particularly dangerous for people who suffer from these inflammatory airway conditions.<sup>37</sup> Studies of gamma tocopherol have shown broad anti-inflammatory effects in allergic animals experiencing airway inflammation by exposure to ozone.<sup>37,38</sup>



## Summary

Vitamin E is one of the earliest-known and best-studied vitamins. Published studies demonstrate that people with higher intakes of *gamma tocopherol* may achieve a considerable *reduction* in their risks of common age-related diseases.

Regrettably, most health conscious individuals take only **alpha** tocopherol and are deprived of the optimal and synergistic benefits provided by the **gamma** tocopherol form of vitamin E.

Human studies indicate benefits with supplemental doses ranging from **100 mg** to **800 mg** of **gamma tocopherol** a day. A review of the scientific literature indicates that most people should supplement with at least **200 mg** of **gamma tocopherol** each day.<sup>1,39</sup>

If you have any questions on the scientific content of this article, please call a Life Extension® Health Advisor at 1-866-864-3027.

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