

Issue 82

Vitamins C and E: interactions

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Arbor Clinical Nutrition Updates 2000 (Oct.);82:1-2
ISSN 1446-5450

NUTRITION RESEARCH REVIEW

Study: Vitamin C and E interactions

Taking supplements of either vitamins C or E increases the levels of the other vitamin, according to new research.

Subjects: 30 healthy adults.

Method: Double-blind crossover study. Subjects were given 2 weeks of placebo, then 6 weeks of either vitamin C (500mg/day) or vitamin E (73.5 mg RRR-alpha-tocopherol acetate/day) and placebo. After a further 2 month washout, supplements were swapped. Fasting blood was collected for vitamin assay.

Results: Taking supplements of one of these vitamins significantly increased the plasma levels of the other vitamin. See Table.

Taking of either vitamin supplement produced an increase in plasma antioxidant (ferric reducing) power and glutathione peroxidase, as well as a decrease in urate, total cholesterol and triacylglycerol levels ($p < 0.05$).

Ref: Hamilton IM et al. Interactions between vitamins C and E in human subjects. *Br. J Nutrition* 2000;84: 261-267

Table: Vitamin levels after taking individual nutrient supplements

	Before	After	p value
Vitamin C supplementation:			
Ascorbic acid*	62.8	101.3	<0.005
Tocopherol**	4.09	4.53	<0.05
Vitamin E supplementation:			
Ascorbic acid*	64.4	76.4	<0.05
Tocopherol**	4.12	5.38	<0.001

* Plasma ascorbic acid ($\mu\text{mol/l}$)

** Lipid-standardised plasma alpha tocopherol ($\mu\text{mol/mmol}$)

Comments

Supplementation with individual or multi- antioxidant vitamins has become a very popular form of self-medication in developed countries. It is also being seriously studied in large scale randomised trials in clinical settings such as cancer prevention.

One of the more interesting questions that arises is how the various antioxidants might interact when given as supplements, with special interest in interaction between vitamin C and vitamin E.

For example, even though vitamin C is water-soluble, it seems to have an effect on lipid peroxidation and lipid membranes. This may well involve vitamin E (which, of course, is fat-soluble).

There is also some evidence that extra vitamin C helps to build vitamin E levels by 'shouldering' part of the antioxidant workload. Some have even hypothesised that vitamin C may be the "terminal small-molecule antioxidant in biological systems" ¹. Interactions between antioxidant vitamins may also be important when assessing the possible side-effects of long term supplementation.

This study is valuable in that it has been carefully designed, with a good washout period between crossover double-blinded intervention phases. It has also used the appropriate measure of vitamin E status, i.e. corrected for lipid concentrations.

The researchers find a significant interaction between levels of the vitamins when each is taken individually. Their study does not explain why this might be so, and this is a question which other researchers have looked at, so far without any definitive answer. If antioxidant supplements continue to be as popular as they have been, it will be important to pursue our understanding of this issue.

Ref: 1. Sharma MK, Buettner GR. Interaction of vitamin C and vitamin E during free radical stress in plasma: an ESR study. *Free Radic Biol Med* 1993; 14:649-53).

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