Heart Smart Nutrition

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Antioxidant Vitamin Supplementation and Coronary Artery Disease

By Maureen Elhatton, RD

Smoking cessation, cholesterol reduction and blood pressure control are some of the major tools being used to reduce coronary artery disease risk, however, certain dietary components and how they may affect a patient's risk profile have also been studied.

The most prominent of these components are the antioxidants. It has been proposed that they inhibit multiple proatherogenic and prothrombotic oxidative events in the artery wall. The complex process of atherosclerosis involves low density lipoprotein (LDL) molecule deposition and cellular proliferation in coronary artery walls. A key role in this process is the oxidation of LDL molecules, which is believed to be proatherogenic. Oxidized LDL is also believed to play a role in precipitating other clinical events such as plaque rupture and thrombosis. Dietary antioxidants receiving the greatest interest in preventing these events include vitamin C, vitamin E (*i.e.*, d-α-tocopherol) and beta-carotene (*i.e.*, provitamin A). The latter two are of interest as they are carried in the LDL molecule. In vitro studies have found enrichment with d-α-tocopherol increases LDL oxidative resistance. The same was not true for beta-carotene. While the theory and in vitro studies have shown promise, the human studies, to date, have not followed this trend.[1]

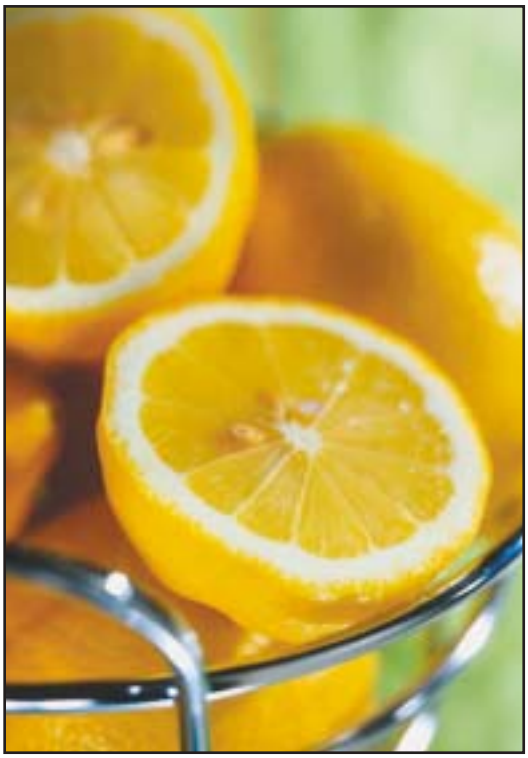

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Table 1

Dietary Reference Intakes, Tolerable Upper Intake Levels and Food Sources for Antioxidant Vitamins

Nutrient	DRI women age 19+	DRI men age 19+	Comments	Good Sources
Beta-carotene	No DRI at this time	No DRI at this time	Due to contradictory advice no DRI and no TUL. Supplementation not advised.	Orange vegetables and fruit
Vitamin C	75 mg per day	90 mg per day	TUL is 2,000 mg per day; amounts over this may cause diarrhea.	Citrus fruit and juice, some vegetables
Vitamin E	15 mg per day (22 IU natural) (33 IU synthetic)	15 mg per day	TUL is 1,000 mg per day, based on intake from supplement only; intake above this increases risk of hemorrhagic damage as vitamin E acts as an anticoagulant.	Oils, whole grain breads, cereals and nuts

DRI = Dietary reference intakes
TUL = Tolerable upper intake levels
IU = International unit

Adapted from Health Canada: Nutrient Value of Some Common Foods. Canadian Government Publishing, Ottawa, Ontario, 1999; and Dietary Reference Intakes 2001 National Academy Press accessed online at *www.nap.edu/books/0309071836/html/*.

In the last decade, many studies have looked at the role of antioxidants in reducing the risk of heart disease. A 1998 study of 29,000 Finnish male smokers taking vitamin E (110 IU) or beta-carotene (33,000 IU) or both or placebo found no difference between the groups in heart attack rates. On a discouraging note, the men with a previous myocardial infarction (MI) who took beta-carotene were more likely to die of heart disease.[2]

In the Heart Outcomes Prevention Evaluation (HOPE) trial, which was one of the largest trials to date, 9,500 people with cardiovascular disease or diabetes took vitamin E (400 IU) or a placebo daily for five years. No difference was noted in the rates of heart attack.[3,4]

More recently, the Heart Protection Study (2002) randomized 20,536 people at high risk of heart disease to vitamin E (600 mg/1,300 IU), vitamin C (250 mg) and beta-carotene (20 mg/33,000 IU) or placebo for five years. Although the use of supplements proved safe for these high-risk individuals, it did not produce any significant reductions in mortality or the incidence of any type of vascular disease, cancer, or other major outcomes.[5]

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In another study of antioxidant use, this time with the cholesterol-lowering medications (simvastatin and niacin), there was a blunting effect on the response of high-density lipoprotein (HDL) with this combination. Increases in HDL were consistently higher in the simvastatin-niacin group than in the group receiving the simvastatin-niacin and antioxidant cocktail (500 mg of vitamin C, 400 IU of vitamin E, 12.5 mg of beta-carotene, and 50 mcg of selenium).[6] For this reason, patients taking a statin medication, combined with niacin, should be warned not to take antioxidant supplements.

While vitamin deficiencies are rare in western societies, the relationship of vitamins to chronic disease patterns is still under investigation. The dietary reference intake (DRI) and tolerable upper intake levels (TUL) for the antioxidants and their common food sources are outlined in Table 1.

Many questions remain to be answered about the use of antioxidant supplements and their speculative role in preventing heart disease. Do high-risk individuals need to start taking them at a younger age? Are there antioxidant and medication combinations that enhance the effect of antioxidants or should some be avoided outright? Scientific studies continue in these, and many other areas related to antioxidant use.

Professional opinion may change. However, at this point, there appears to be no need to supplement specific vitamins unless medically indicated. For those individuals convinced of the benefits of supplementation, a multivitamin may cover all the requirements nicely. The goal is still to eat a variety of foods, as it may not be a specific vitamin or nutrient but some unknown ingredient or combination of ingredients that conveys a lower risk for chronic diseases.[7]

References:

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