

## Vitamin E

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Vitamin E is the main antioxidant in lipid-rich tissue throughout the body, including cell membranes and the tissues of the central nervous system and brain. Vitamin E is also an important protector of low-density lipoproteins. For almost 20 years some researchers have theorized that it is not the cholesterol but cholesterol oxides that cause damage to our arterial walls and begin the cascade of cardiovascular disease. What was once a theory is now becoming accepted by more and more scientists. In addition, vitamin E can help protect any part of the body that is susceptible to oxidative damage.

Vitamin E is not a typical vitamin. A typical vitamin functions as a co-factor for specific enzymatic reactions. Vitamin E is not a co-factor in any reaction. A typical vitamin, when removed from the diet, will result in a specific disease, such as scurvy or beriberi. There is no specific disease caused by a lack of vitamin E.

The RDA for vitamin E is 15 international units (IU), set by the Food and Nutrition Board of the National Research Council. The U.S. RDA set by the FDA is 30 IU. Based on extensive literature review, the Vitamin E Research and Information Service states that at least 150 IU per day are needed for adequate antioxidant purposes. The average diet does not come close to this level. In fact, in a 1985 U.S. food consumption survey by the Department of Agriculture, it was found that 70 percent of women between the ages of 19 and 50 got less than 15 IU of vitamin E per day. Add to this the fact that the best sources of vitamin E are vegetable oils commonly consumed as salad dressings and, with our diet conscious society, oil-based salad dressings are frequently being omitted in favor of low calorie fat-free versions.

### Dietary Sources of Vitamin E

Below are some of the main dietary sources of vitamin E based on 100 gm (3 and 1/2 oz) portions.<sup>1</sup>

Oils and Fats	Vitamin E in IU
Wheat Germ Oil	178
Sunflower Oil	72.6
Safflower Oil	59
Peanut Oil	28
Soft Margarine	29.7
Mayonnaise	19.3
Hard Margarine	16
Soybean Oil	11.8

Butter	3.2
Grains	
Wheat Germ	17.4
Rolled Oats	2
Brown Rice, Cooked	2
Whole Wheat Bread	0.8
White Rice, Cooked	0.1
Nuts and Seeds	
Raw Sunflower Seeds	73.4
Almonds	40.5
Dry Roasted Peanuts	10.7
Peanut Butter	9.2
Cashews	0.3
Meat, Fish, Dairy	
Broiled Liver	0.9
Shrimp, Baked	0.9
Fried Chicken	0.9
Eggs	0.7
Bacon	0.7
Broiled Chicken	0.6
Broiled Steak	0.5
Fruits	
Blackberries	4.9
Apples	0.5
Bananas	0.3
Cantaloupe	0.2
Strawberries	0.2
Fresh Vegetables	
Asparagus	2.7

Spinach	2.7
Peas	0.8
Broccoli	0.7

### Examples of Vitamin E Processing Losses

Food processing can destroy vitamin E. Below are some examples.

### Food Conditions Vitamin E Loss

Peanut Oil Deep frying for 30 minutes	32%
Safflower Oil 3 months room temperature storage	55%
Nuts Roasted	80%
Potato Chips Stored unopened for one month at 73°F	71%
Ground Corn 6 months room temperature storage	35%
Wheat Germ Storage at 39°F 6 months	10%
Wheat Processed to white flour	92% <sup>2</sup>

### Forms of Vitamin E

Natural vitamin E, d-alpha-tocopherol comes from vegetable oil. Synthetic vitamin E, dl-alpha-tocopherol, is made from petrochemicals. Both natural and synthetic vitamin E can also come in the ester forms acetate and acid succinate. When vitamin E is in an ester form, it is labelled tocopheryl.

The tocopherol forms of vitamin E are the most fragile. They are commonly used in oil-based soft gel capsules. They should be stored in a dark, cool place. The containers they are in should be a dark or solid color. The acetate form is also oil based, however, it is more stable. It is a form that is commonly used in creams, shampoos, and other liquid forms. The acid succinate form is a solid form. It is most commonly used in dry vitamin E products such as multivitamins, tablets, and capsules.

Below is a chart comparing vitamin E activity. As you can see, natural vitamin E has more activity than synthetics.<sup>3</sup>

Compound (1 mg)	IU Activity
d-alpha-tocopherol	1.49
d-alpha tocopheryl acetate	1.36
d-alpha tocopheryl acid succinate	1.21
dl-alpha-tocopherol	1.1
dl-alpha-tocopheryl acetate	1
dl-alpha-tocopheryl acid succinate	0.9*

- dl-alpha-tocopheryl acid succinate was not listed in the referenced chart. The IU activity is my

estimate.

## Dosing

Although researchers in the vitamin E industry feel that 150 IU per day is the minimum amount needed to insure adequate antioxidant potential for humans, the most common dose of vitamin E taken by Americans is a 400 IU dose based on a Gallup poll on vitamin use. At 400 IU per day, I have not seen any well-controlled human studies that have shown this amount to be toxic. Nevertheless, there are nutritional conservatives who feel this dose is excessive. This author happens to disagree.

## Vitamin E Side Effects

Vitamin E is the safest fat-soluble vitamin. Many books on nutrition list no side effects of excessive vitamin E intake, and studies using a whopping 3200 mg per day dosage have found no side effects, though there are some anecdotal reports of problems with vitamin E use. These include fatigue, intestinal cramping, breast soreness, thrombophlebitis, acne, and diarrhea.<sup>4</sup> In some people large doses of vitamin E can cause gastrointestinal disturbances such as nausea, gas, or diarrhea.<sup>5</sup> Gastrointestinal problems with vitamin E can be minimized if it is taken with a large meal. Vitamin E may also exacerbate hypertension.<sup>6</sup> If you have a patient who is hypertensive, taking vitamin E is not contraindicated. However their blood pressure should be monitored and, obviously, if vitamin E does cause problems, intake should be reduced.

In their book *The Vitamin Pushers*, Stephen Barrett and Victor Herbert have the longest list of vitamin E side effects I have ever seen. They state and I quote: "Headaches, nausea, tiredness, giddiness, inflammation of the mouth, chapped lips, gastrointestinal disturbances, muscle weakness, low blood sugar, increased bleeding tendency, and degenerative changes." Unfortunately, this statement is not referenced.

## Vitamin E Interactions with Nutrients

I think most DCs are aware that vitamin E and selenium are synergistic. Many people feel they should be taken together, and I agree. Vitamin E is antagonistic to iron. Patients who have anemia and are taking extra iron should not take this iron at the same time they take vitamin E. For normally healthy people, taking multivitamins that contain both vitamin E and iron does not seem to be a problem. Patients who take high amounts of the antioxidant vitamins A and C should also increase their vitamin E intake.

## References

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