



Vitamin E - description, benefits, effects on the body and the best sources

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Abstract. The article discusses the main properties of the vitamin E and its effect on the human body. A systematic review of modern specialized literature and relevant scientific data was carried out. The best natural sources of vitamin E are indicated. The use of the vitamin in various types of medicine and the effectiveness of its use in various diseases are considered. The potentially adverse effects of vitamin E on the human body under certain medical conditions and diseases are analyzed separately.

Keywords: vitamin E, vitamin E , benefits, harms, beneficial properties, contraindications, sources

Discovery history

Vitamin E was first discovered in 1922 by scientists Evans and Bishop as an unknown component in vegetable oils required for reproduction in female rats. This observation was immediately published, and initially the substance was called " *factor X* " and " *factor against infertility* ", and later Evans proposed to officially accept the letter E for it - following the recently discovered vitamin D.

The active vitamin E compound was isolated in 1936 from wheat germ oil. Because this substance allowed animals to have offspring, the research team decided to name it alpha-tocopherol, from the Greek " *tocos* " (meaning childbirth) and " *feroin* " (to raise). To indicate the presence of an OH group in the molecule, " ol " was added to the end . Its correct structure was given in 1938 and the substance was first synthesized by P. Carrer , also in 1938. In the 1940s, a team of Canadian doctors discovered that vitamin E could protect people from coronary heart disease. The demand for vitamin E has increased rapidly. Along with market demand, the number of product types available to the pharmaceutical, food, feed and cosmetics industries has increased. In 1968, the Nutrition and Nutrition Boards of the National Academy of Sciences officially recognized vitamin E as an essential nutrient ^[3]

Foods rich in vitamin E

The content of vitamin E in food ^[1,2,4] :

Wheat germ oil	149.4
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Sunflower oil	41.08
Almond oil	39.2
Sunflower seeds	35.17
Almond	25.63
Hazelnut	15.03
Olive oil	14.35
pine nut	9.33
Peanuts (raw)	8.33
Brazilian nut	5.65
Dried apricots	4.33
Olives	3.81
Salmon	3.55
Pistachio (raw)	2.86
turnip tops	2.86
Crayfish	2.85
Trout	2.34
Butter	2.32
Pumpkin seeds (dried)	2.18
Avocado	2.07
Spinach	2.03
Chard	1.89
red bell pepper	1.58
curly cabbage	1.54
Kiwi	1.46
Octopus	1.2
Blackberry	1.17
Asparagus	1.13
Black currant	one
Mango	0.9
Apricot	0.89
Raspberry	0.87
Broccoli	0.78
Papaya	0.3
Sweet potato	0.26

See also [Top 100 Natural Sources of Vitamin E](#).

Daily requirement for vitamin E

As we can see, vegetable oils are the main sources of vitamin E. Also, a large amount of the vitamin can be obtained from nuts. Vitamin E is very important for our body, so it is necessary to ensure the supply of a sufficient amount of it with food. According to official data, the daily intake of vitamin E is:

Age	Men: mg/day (International Units/day)	Women: mg/day (International Units/day)
Infants 0-6 months	4 mg (6 IU)	4 mg (6 IU)

Infants 7-12 months	5 mg (7.5 IU)	5 mg (7.5 IU)
Children 1-3 years old	6 mg (9 IU)	6 mg (9 IU)
Children 4-8 years old	7 mg (10.5 IU)	7 mg (10.5 IU)
Children 9-13 years old	11 mg (16.5 IU)	11 mg (16.5 IU)
Teenagers 4-18 years old	15 mg (22.5 IU)	15 mg (22.5 IU)
Adults 19 years and older	15 mg (22.5 IU)	15 mg (22.5 IU)
Pregnant (any age)		15 mg (22.5 IU)
Breastfeeding mothers (any age)		19 mg (28.5 IU)

Scientists believe that there is strong evidence that daily intake of at least 200 IU (134 mg) of alpha-tocopherol may protect adults from certain chronic diseases such as heart problems, stroke, neurodegenerative diseases and certain types of cancer.

A major problem in formulating vitamin E recommendations is dependence on polyunsaturated fatty acid (PUFA) intake. There are large differences in PUFA consumption across Europe. Based on the proportional relationship between vitamin E requirement and PUFA, recommendations should take into account the different acid intake in different populations. Given the difficulty of achieving recommendations with optimal effects on human metabolism, the recommended daily intake of vitamin E for adults, expressed in milligrams of alpha - tocopherol equivalents (mg alpha-TEQ), differs in European countries:

- in Belgium, 10 mg per day;
- in France, 12 mg per day;
- in Austria, Germany, Switzerland - 15 mg per day;
- in Italy - more than 8 mg per day;
- in Spain, 12 mg per day;
- in the Netherlands - women 9.3 mg per day, men 11.8 mg per day;
- in the Nordic countries - women 8 mg per day, men 10 mg per day;
- in the UK - women over 3 mg per day, men over 4 mg per day ^[5,6].

Generally, we can get enough vitamin E from food. In some cases, the need for it may increase, for example, in severe chronic diseases:

- chronic pancreatitis;
- cholestatic syndrome;
- cystic fibrosis;
- primary biliary cirrhosis;
- Crohn's disease;
- irritable bowel syndrome;
- ataxia.

These diseases prevent the absorption of vitamin E in the intestine ^[7].

Chemical and physical properties

Vitamin E refers to all tocopherols and tocotrienols that exhibit alpha-tocopherol activity. Due to the phenolic hydrogen on the 2H-1-benzopyran-6-ol core, these compounds exhibit varying degrees of antioxidant activity depending on the location and number of methyl groups and the type of isoprenoids. Vitamin E is stable when heated to temperatures between 150 and 175°C. It is less stable in acidic and alkaline environments. α -Tocopherol has the consistency of a clear, viscous oil. It may break down during some types of food processing. At temperatures below 0° C, it loses its activity. Its

activity adversely affects iron, chlorine and mineral oil. Insoluble in water, freely soluble in ethanol, miscible in ether. Color - from slightly yellow to amber, almost odorless, oxidizes and darkens when exposed to air or light ^[8,9].

The term vitamin E encompasses eight related, naturally occurring fat-soluble compounds: four tocopherols (alpha, beta, gamma, and delta) and four tocotrienols (alpha, beta, gamma, and delta). In humans, only alpha-tocopherol is selected and synthesized in the liver, so it is the most abundant in the body. The form of alpha-tocopherol found in plants is RRR-alpha-tocopherol (also called natural or d-alpha tocopherol). The form of vitamin E primarily used in fortified foods and nutritional supplements is all - rac -alpha-tocopherol (synthetic or dl -alpha-tocopherol). It contains RRR-alpha-tocopherol and seven very similar forms of alpha-tocopherol. All - rac -alpha-tocopherol is defined as slightly less biologically active than RRR-alpha-tocopherol, although this definition is currently being revised ^[10].

Useful properties and its effect on the body

Metabolism in the body

Vitamin E is a fat-soluble vitamin that is broken down and stored in body fat. It acts as an antioxidant, destroying free radicals that damage cells. Free radicals are molecules that have an unpaired electron, making them highly reactive. They feed on healthy cells during a series of biochemical processes. Some free radicals are natural by-products of digestion, others come from cigarette smoke, grill carcinogens, and other sources. Healthy cells damaged by free radicals can lead to the development of chronic diseases such as heart disease and cancer. Having enough vitamin E in the diet can serve as a preventative measure to protect the body from these diseases. **Optimal absorption is achieved when vitamin E is ingested with food** ^[11].

Vitamin E is absorbed into the intestines and enters the bloodstream through the lymphatic system. It is absorbed along with lipids, enters the chylomicrons and is transported to the liver with their help. This process is similar for all forms of vitamin E. Only after passing through the liver, α -tocopherol appears in plasma. Most of the consumed β -, γ - and δ -tocopherol is secreted into bile or not absorbed and excreted from the body. The reason for this is the presence in the liver of a special substance - a protein that transports exclusively α -tocopherol, TTRA.

Plasma administration of RRR- α -tocopherol is a saturating process. Plasma levels stop rising at ~80 μ M when supplemented with vitamin E, even though doses are increased to 800 mg. Studies show that the limitation of plasma α -tocopherol concentration appears to be the result of a rapid replacement of circulating newly absorbed α -tocopherol. These data are consistent with kinetic analyzes demonstrating that the entire plasma composition of α -tocopherol is renewed daily ^[12].

Interaction with other elements

Vitamin E has an antioxidant effect when combined with other antioxidants, including beta-carotene, vitamin C, and selenium. Vitamin C can restore oxidized vitamin E to its natural antioxidant form. Megadoses of vitamin C may increase the need for vitamin E. Vitamin E may also protect against some of the effects of excess vitamin A and regulate vitamin A levels. Vitamin E is essential for the action of vitamin A, and a high intake of vitamin A can reduce the absorption of vitamin E.

Vitamin E may be needed to convert vitamin B12 to its active form and may reduce some of the symptoms of zinc deficiency. Large doses of vitamin E may interfere with the anticoagulant effect of vitamin K and may reduce intestinal absorption of vitamin K.

Vitamin E increases the absorption of vitamin A in the intestine at medium and high concentrations, up to 40%. A and E together lead to increased antioxidant capacity, protection against certain forms of cancer, and support for gut health. They work synergistically to prevent obesity, hearing loss, metabolic syndrome, inflammation, immune response, and brain health.

Selenium deficiency exacerbates the effects of vitamin E deficiency, which in turn can prevent selenium toxicity. A combined deficiency of selenium and vitamin E has a greater effect on the body than a deficiency of only one of the nutrients. The combined action of vitamin E and selenium may help prevent cancer by stimulating apoptosis in abnormal cells.

Inorganic iron interferes with the absorption of vitamin E and can destroy it. Vitamin E deficiency exacerbates iron excess, but supplemental vitamin E prevents it. It is best to take these supplements at different times ^[13,14].

Digestibility

Vitamins bring the greatest benefit if they are combined correctly. For the best effect, we recommend using the following combinations ^[15,16]:

- tomato and avocado;
- fresh carrots and nut butter;
- greens and salad with olive oil;
- sweet potato and walnut;
- sweet pepper and guacamole .

A combination of spinach (moreover, succumbing to heat treatment, it will have great nutritional value) and vegetable oil will be useful.

Natural vitamin E is a family of 8 different compounds - 4 tocopherols and 4 tocotrienols . This means that if you consume certain healthy foods, you will get all of these 8 compounds. In turn, synthetic vitamin E contains only one of these 8 components (*alpha-tocopherol*). Thus, a vitamin E tablet is not always a good idea. Synthetic medicines cannot give you what natural sources of the vitamin can. There are a small number of medicinal vitamins that also contain vitamin E acetate and vitamin E succinate . While they are known to help prevent heart disease, we still recommend that you get your vitamin E from your diet ^[1].

Application in official medicine

Vitamin E performs the following functions in the body:

- maintaining healthy cholesterol levels in the body;
- fighting free radicals and preventing the occurrence of diseases;
- restoration of damaged skin;
- maintaining hair density;
- balance of hormone levels in the blood;
- relief of symptoms of premenstrual syndrome;
- improvement of vision;
- slowing down the process of dementia in Alzheimer's disease and other neurodegenerative diseases;
- possible reduction in the risk of cancer;
- increased endurance and muscle strength;
- of great importance during pregnancy, growth and development.

Taking vitamin E in the form of a drug is effective in the treatment of:

- ataxia - a motor disorder associated with a lack of vitamin E in the body;
- vitamin E deficiency. In this case, as a rule, 60-75 International Units of vitamin E per day are prescribed.

In addition, vitamin E can help with diseases such as:

anemia, bladder cancer, dementia, dyspraxia (dysmotility), granulomatosis, Parkinson's disease

Name of the disease	Dosage
Alzheimer's disease, slowing down memory deterioration	up to 2000 International Units daily
beta thalassemia (blood disease)	750 IU per day;
dysmenorrhea (painful menstruation)	200 IU twice a day or 500 IU a day two days before period and for the first three days
male infertility	200 - 600 IU per day
rheumatoid arthritis	600 IU per day
sunburn	1000 IU combined + 2 grams of ascorbic acid
premenstrual syndrome	400 IU

Most often, the effectiveness of vitamin E in such cases is manifested in combination with other drugs. Before taking it is necessary to consult with your doctor ^[17].

In pharmacology, vitamin E is found in the form of soft capsules of 0.1 g, 0.2 g and 0.4 g, as well as a solution of tocopherol acetate in oil in vials and ampoules, fat-soluble vitamins, powder for the manufacture of tablets and capsules with a content of 50% vitamin E. These are the most common forms of the vitamin. In order to convert the amount of a substance from International Units to mg, it is necessary to equate 1 IU to 0.67 mg (if we are talking about the natural form of the vitamin) or to 0.45 mg (synthetic substance). 1 mg of alpha-tocopherol is equal to 1.49 IU in natural form or 2.22 synthetic substances. The vitamin dosage form is best taken before or during meals ^[6].

Application in traditional medicine

Traditional and alternative medicine values vitamin E primarily for its nourishing, regenerative and moisturizing properties. Oils, as the main source of the vitamin, are very often found in folk recipes for various diseases and skin problems. For example, olive oil is considered an effective remedy for psoriasis - it moisturizes, soothes the skin and reduces inflammation. It is recommended to apply oil on the scalp, elbows and other affected areas.

For the treatment of various types of dermatitis, jojoba oil, coconut oil, wheat germ oil, grape seed oil are used. All of them help cleanse the skin, soothe inflamed areas and saturate the skin with beneficial substances.

Comfrey ointment, which includes vitamin E, is recommended for arthritis. To do this, first mix the leaves or roots of comfrey (1:1, as a rule, a glass of oil to 1 glass of the plant), then make a decoction from the resulting mixture (boil for 30 minutes). After that, the broth is filtered and a quarter cup of beeswax and a little pharmacy vitamin E are added. A compress is made from this ointment, kept on painful areas for a day ^[18].

Another of the many plants containing vitamin E is ivy. For treatment, the roots, leaves and branches of the plant are used, which are used as an antiseptic, anti-inflammatory effect, have expectorant, diuretic and antispasmodic effects. The decoction is used for rheumatism, gout, purulent wounds, amenorrhea and tuberculosis. It is necessary to use preparations from ivy with caution, since the plant itself is poisonous and is contraindicated in pregnancy, hepatitis and children ^[19].

Traditional medicine often uses walnuts as a remedy for many ailments. Like all nuts, it is a storehouse of vitamin E. Moreover, both ripe and unripe fruits, leaves, seeds, shells and seed oil are used. For example, a decoction of walnut leaves is used in the form of compresses to speed up wound healing. A decoction of unripe fruits is recommended to be drunk as tea three times a day for stomach diseases, parasites, scrofula, hypovitaminosis, scurvy and diabetes. Alcohol infusion is used for dysentery, pain in the organs of the urinary system. A tincture of golden mustache leaves, walnut kernels, honey and water is taken as a remedy for bronchitis. Unripe nuts in folk medicine are considered a powerful remedy for parasites. Walnut peel jam helps with inflammation of the kidneys and fibroids.

In addition, vitamin E is traditionally considered a fertility vitamin, it is used for ovarian failure syndrome, male and female infertility. For example, a mixture of evening primrose oil and pharmacy vitamin E is considered effective (1 tablespoon of oil and 1 vitamin capsule, taken for a month three times a day before meals).

A universal remedy is an ointment based on sunflower oil, beeswax and honey. Such an ointment is advised to be used externally (for the treatment of various skin lesions, from mastopathy) and internally (in the form of tampons for a runny nose, inflammation of the ears, diseases of the reproductive organs, as well as ingestion for constipation and peptic ulcers).

Vitamin E in scientific research

- A new study has identified genes that control the amount of vitamin E in corn grains, which can stimulate further improvement in the food and nutritional qualities of the product. Scientists conducted several types of analyzes to identify 14 genes that synthesize vitamin E. Recently, six protein-coding genes responsible for the synthesis of vitamin E have been discovered. Breeders are working to increase the amount of provitamin A in corn, while increasing the composition of vitamin E. and tocochromanols are essential for seed viability. They prevent oil from settling in seeds during storage, germination and early seedlings ^[20].
- Vitamin E is so popular among bodybuilders for a reason - it really helps maintain muscle strength and health. Scientists have finally managed to understand how this happens. Vitamin E has long established itself as a powerful antioxidant, and it has recently been studied that without it, the plasma membrane (which protects the cell from leakage of its contents, and also controls the flow and release of substances) would not be able to fully recover. Since vitamin E is fat soluble, it can actually be incorporated into the membrane, protecting the cell from free radical attack. It also helps preserve phospholipids, one of the most important cellular components responsible for repairing cells after damage. For example, during exercise, mitochondria burn much more oxygen than usual, leading to more free radical production and membrane damage. Vitamin E ensures their full recovery, despite increased oxidation, keeping the process under control ^[21].

- Vitamin E-deficient zebrafish produced offspring with behavioral and metabolic problems, according to a new study from the University of Oregon. These findings are significant because the neurological development of zebrafish is similar to human neurological development. The problem can be exacerbated in women of childbearing age, who avoid high-fat foods and avoid oils, nuts and seeds, which are among the foods with the highest levels of vitamin E, an antioxidant essential for normal embryonic development in vertebrates. Embryos lacking vitamin E had more deformities and a higher death rate, as well as an altered DNA methylation status as early as five days after fertilization. Five days is the time it takes for a fertilized egg to become a swimming fish. The results of the study suggest that vitamin E deficiency in zebrafish produces long-term impairments that are not remedied even with later dietary vitamin E supplementation ^[22].
- A new discovery by scientists proves that eating a salad with the addition of vegetable fat helps the absorption of eight nutrients. And eating the same salad, but without oil, we reduce the body's ability to absorb trace elements. Some types of salad dressings can help you absorb more nutrients, according to research. Researchers have found increased absorption of several fat-soluble vitamins in addition to beta-carotene and three other carotenoids. Such a result may reassure those who, even when on a diet, cannot resist adding a drop of oil to a light salad ^[23].
- Preliminary evidence suggests that antioxidant vitamin E and selenium supplements - alone or in combination - do not prevent dementia in asymptomatic older men. However, such a conclusion cannot be conclusive due to insufficient study, enrollment of only males, short drug exposure times, different dosages, and methodological limitations based on actual incident reporting ^[24].

Use in cosmetology

Due to its valuable properties, vitamin E is very often an ingredient in many cosmetics. In its composition, it is indicated as "**tocopherol**" ("*tocopherol*") or "**tocotrienol**" ("*tocotrienol*"). If the name is preceded by a "d" prefix (for example, d - alpha - tocopherol), then the vitamin is derived from natural sources; if the prefix is "dl", then the substance was synthesized in the laboratory. Cosmetologists appreciate vitamin E for the following characteristics:

- vitamin E is an antioxidant and destroys free radicals;
- it has sunscreen properties, namely, it increases the effectiveness of the sunscreen effect of special creams, and also alleviates the condition after sunburn;
- has moisturizing qualities - in particular, alpha-tocopherol acetate which strengthens the natural skin barrier and reduces the amount of fluid lost;
- an excellent preservative that protects active ingredients in cosmetics from oxidation ^[25].

There are also a very large number of natural recipes for skin, hair and nails that effectively nourish, restore and tone them. The easiest way to care for the skin is to massage various oils into the skin, and for the hair, apply the oil to the entire length of the hair for at least an hour before washing once or twice a week. If you have dry or flaccid skin, try using a mixture of rose oil and pharmacy vitamin E to stimulate collagen production. Another anti-aging recipe includes cocoa butter, sea buckthorn and tocopherol solution. A mask with aloe vera juice and a solution of vitamin E, vitamin A and a small amount of nourishing cream nourishes the skin. An exfoliating universal effect will bring an egg white mask, a spoonful of honey and a dozen drops of vitamin E.

Dry, normal and combination skin will be transformed by a mixture of banana pulp, high fat cream and a few drops of tocopherol solution. If you want to give your skin an extra tone, mix the pulp of a cucumber and a couple of drops of an oil solution of vitamin E. An effective mask with vitamin E for wrinkles is a mask with pharmacy vitamin E, potato pulp and parsley sprigs. A mask consisting of 2 milliliters of tocopherol, 3 teaspoons of red clay and anise essential oil will help get rid of acne. For

dry skin, try mixing 1 ampoule of tocopherol and 3 teaspoons of kelp - this mask will moisturize and restore the skin.

If you have oily skin, use a mask that contains 4 milliliters of vitamin E, 1 crushed activated charcoal tablet and three teaspoons of ground lentils. For aging skin, a sheet mask is also used, which includes wheat germ oil with the addition of other essential oils - rose, mint, sandalwood, neroli .

Vitamin E is a powerful stimulant for the growth of eyelashes: castor oil, burdock, peach oil are used for this, which are applied directly to the eyelashes.

For the health and beauty of hair, masks containing vitamin E are indispensable. For example , a nourishing mask with jojoba oil and burdock oil. For dry hair, a mask of burdock, almond and olive oils, as well as an oil solution of vitamin E, is suitable . If you notice that your hair has begun to fall out, try applying a mixture of potato juice, aloe vera juice or gel, honey and pharmacy vitamins E and A. To add shine to your hair, you can mix olive and burdock oil, vitamin E oil solution and one egg yolk. And, of course, we must not forget about wheat germ oil - a vitamin "bomb" for hair. To refresh and add shine to your hair, combine banana pulp, avocado, yogurt, vitamin E oil solution and wheat germ oil. All of the above masks should be applied for 20-40 minutes, wrapping the hair with a plastic bag or cling film, and then rinse with shampoo.

To keep your nails healthy and beautiful, it is useful to apply the following masks:

- sunflower or olive oil, a few drops of iodine and a few drops of vitamin E - will help with exfoliating nails;
- vegetable oil, an oil solution of vitamin E and a little red pepper - to accelerate the growth of nails;
- walnut oil, vitamin E and lemon essential oil - from brittle nails;
- olive oil and vitamin E solution - to soften the cuticles.

Use in animal husbandry

All animals need adequate levels of vitamin E in the body to support healthy growth, development and reproduction. Stress, exercise, infection and tissue injury increase the animal's need for the vitamin.

It is necessary to ensure its intake through food - fortunately, this vitamin is widely distributed in nature. Vitamin E deficiency in animals manifests itself in the form of diseases, most often attacking body tissues, muscles, and also manifests itself in the form of apathy or depression ^[36] .

Use in crop production

A few years ago, researchers at the University of Toronto and Michigan made a discovery about the benefits of vitamin E for plants. As it turned out, the addition of vitamin E to the fertilizer will reduce the susceptibility of plants to cold temperatures. As a result, this makes it possible to discover new, cold-resistant varieties that will bring a better harvest. Gardeners who live in colder climates can experiment with vitamin E and see how it affects plant growth and longevity ^[27] .

The use of vitamin E in industry

Vitamin E is widely used in the cosmetic industry - it is a very common component of creams, oils, ointments, shampoos, masks, etc. In addition, it is used in the food industry as a food additive E307. This supplement is completely harmless and has the same properties as a natural vitamin ^[28] .

Contraindications and warnings

Vitamin E is a fat-soluble vitamin, it is not destroyed when exposed to sufficiently high temperatures (up to 150-170°C). It is exposed to ultraviolet rays and loses its activity when frozen.

Signs of vitamin E deficiency

True vitamin E deficiency is very rare. Overt symptoms have not been found in healthy people receiving at least a minimal amount of the vitamin from food.

Vitamin E deficiency can be experienced by premature infants born weighing less than 1.5 kg. Also, people who have problems with the absorption of fat in the digestive tract are at risk of developing a vitamin deficiency. Symptoms of vitamin E deficiency are peripheral neuropathy, ataxia, skeletal myopathy, retinopathy, and impaired immune response. The following symptoms may also be a sign that your body is not getting enough vitamin E:

- difficulty walking and difficulty in coordination;
- muscle pain and weakness;
- visual disturbances;
- general weakness;
- decrease in sexual desire;
- anemia.

If you notice one of these symptoms, it is worth considering a visit to the doctor. Only an experienced specialist will be able to determine the presence of a particular disease and prescribe the appropriate treatment. As a rule, vitamin E deficiency occurs as a result of genetic diseases such as Crohn's disease, ataxia, cystic fibrosis and other diseases. Only in this case, large doses of medicinal vitamin E supplements are prescribed.

Precautionary measures

For most healthy people, vitamin E is very beneficial, both when taken orally and when applied directly to the skin. Most people do not experience any side effects at the recommended dose, but adverse reactions may occur at high doses. It is dangerous to exceed the dose if you suffer from heart disease or diabetes. In this case, the dose of 400 International Units (about 0.2 grams) per day should not be exceeded.

Some studies show that taking high doses of vitamin E, which is between 300 and 800 IU each day, can increase the chance of a hemorrhagic stroke by 22%. Another serious side effect of consuming too much vitamin E is an increased risk of bleeding.

Avoid taking supplements containing vitamin E or any other antioxidant vitamins immediately before and after angioplasty.

Very high vitamin E supplements can potentially lead to the following health problems:

- heart failure in people with diabetes;
- worsening bleeding;
- the risk of recurrence of cancer of the prostate, neck and head;
- increased bleeding during and after surgery;
- an increased chance of dying from a heart attack or stroke.

One study found that vitamin E supplements can also be harmful for women who are in the early stages of pregnancy. High doses of vitamin E can also sometimes lead to nausea, diarrhea, abdominal cramps, fatigue, weakness, headache, blurred vision, rash, bruising, and bleeding.

Interaction with other drugs

Since vitamin E supplements can slow blood clotting, they should be taken with caution with similar medications (aspirin, clopidogrel, ibuprofen, and warfarin) as they can markedly increase this effect.

Cholesterol-lowering medications can also interact with vitamin E. It is not known for sure whether the effectiveness of such medications is reduced when taking vitamin E alone, but in combination with vitamin C, beta-carotene and selenium, this effect is very often observed [6, 7, 29].

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Vitamin E - useful properties, composition and contraindications

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Received 03/27/18

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