



## Vitamin A (retinol) - description, benefits and where it is found

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**Abstract.** A fat-soluble vitamin, an essential component for healthy growth, formation of bone and tooth tissue, and cell structure. It is of great importance for night vision, necessary for protection against infections of the tissues of the respiratory, digestive and urinary tracts. Responsible for the beauty and youth of the skin, healthy hair and nails, visual acuity. Vitamin A is absorbed in the body in the form of retinol, which is found in liver, fish oil, egg yolk, dairy products and added to margarine. Carotene, which is converted into retinol in the body, is found in many vegetables and fruits.

*Key words:* vitamin A, beneficial properties, potentially dangerous effects, side effects, beneficial properties, contraindications, sources

### History of discovery

The first prerequisites for the discovery of Vitamin A and the consequences of its deficiency appeared back in 1819, when the French physiologist and psychologist Magendie noticed that dogs receiving poor nutrition were more likely to get corneal ulcers and have a higher mortality rate.

In 1912, British biochemist Frederick Gowland Hopkins discovered hitherto unknown substances in milk that were not like fats, carbohydrates, or proteins. Upon closer examination, it turned out that they contributed to the growth of laboratory mice. Hopkins received the Nobel Prize in 1929 for his discoveries. In 1917 Elmer McCollum, Lafayette Mendel, and Thomas Burr Osborne also saw similar substances when studying the role of dietary fats. In 1918, these “extra substances” were discovered to be fat-soluble, and in 1920 they were finally given the name Vitamin A.

### Vitamin A Rich Foods

Approximate presence in 100 g of product is indicated <sup>[9]</sup>

Product, 100 grams	Vitamin A, RAE (mcg)
Fish fat	30000

Duck liver	11984
Lamb liver	7391
Pork liver	6502
Beef liver	4968
Chicken liver	3296
Fresh eel	1043
Liver pate	991
Fresh carrots _ _	835
Sweet potato	709
Butter, salted	684
Fresh tuna	655
Kale	500
Spinach	469
Parsley	421
Cream	411
Egg yolk, raw	381
Cilantro	337
Cheese	292
Soft goat cheese	288
Caviar, red or black	271
Basil	264
Royal mackerel, raw	218
Rose hips, fruits	217
Egg raw	160
Quail egg	156
Sour cream	124
Apricot	96
Leek	83
Mango	54
Fennel, root	48
Red chili pepper	48
Grapefruit	46
Tomato	42
Prunes	39
Broccoli	31
Oysters	8
Cottage cheese	2

### [Top 100 Natural Sources of Vitamin A](#)

#### **Daily requirement for vitamin A**

Recommendations for daily vitamin A intake are based on the amount needed to supply several months of retinol . This reserve maintains the normal functioning of the body and ensures healthy functioning of the reproductive system, immunity, vision and gene activity.

In 1993, the European Scientific Committee on Nutrition published recommended intakes for vitamin A:

Age	Men (mcg per day)	Women (mcg per day)
6-12 months	350	350
1-3 years	400	400
4-6 years	400	400
7-10 years	500	500
11-14 years old	600	600
15-17 years old	700	600
18 years and older	700	600
Pregnancy	-	700
Lactation	-	950

Many European nutrition committees, such as the German Nutrition Society (DGE), recommend 0.8 mg (800 mcg) of vitamin A (retinol) per day for women, and 1 mg (1000 mcg) for men. Since vitamin A plays a significant role in the normal development of the embryo and newborn, pregnant women are advised to take 1.1 mg of vitamin A starting from the 4th month of pregnancy. Women who are breastfeeding should receive 1.5 mg of vitamin A per day.

In 2015, the European Food Safety Authority (EFSA) established that the daily intake of vitamin A should be 750 mcg for men, 650 mcg for women, and for newborns and children - from 250 to 750 mcg of vitamin A per day, taking into account age. During pregnancy and lactation, the additional amount of vitamin that must be supplied to the body due to the accumulation of retinol in the tissues of the fetus and mother, as well as the entry of retinol into breast milk, was indicated at 700 and 1,300 mcg per day, respectively.

In 2001, the American Food and Nutrition Council also established the recommended intake of vitamin A:

Age	Men (mcg per day)	Women (mcg per day)
0-6 months	400	400
7-12 months	500	500
1-3 years	300	300
4-8 years	400	400
9-13 years	600	600ghghghghghghghghgh
14-18 years old	900	700
19 years and older	900	700

Pregnancy (18 years and younger)	-	750
Pregnancy (19 years and older)	-	770
Breastfeeding (18 years and younger)	-	1200
Breastfeeding (19 years and older)	-	1300

As we can see, although the amount varies according to different organizations, the approximate daily intake of vitamin A remains at the same level.

The need for vitamin A increases with:

1. weight gain;
2. strenuous physical work;
3. working night shifts;
4. participation in sports competitions;
5. stressful situations;
6. working in poor lighting conditions;
7. additional strain on the eyes from monitors;
8. pregnancy, breastfeeding;
9. problems with the gastrointestinal tract;
10. ARVI.

### **Physical and chemical properties**

Vitamin A is a fat-soluble vitamin that is part of a group of molecules with a similar structure - retinoids - and occurs in several chemical forms: aldehydes ( retinal ), alcohol ( retinol ) and acid ( retinoic acid). In animal foods, the most common form of vitamin A is an ester, primarily retinyl palmitate, which is synthesized into retinol in the small intestine. Provitamins - biochemical precursors of vitamin A - are present in foods of plant origin; they are components of the carotenoid group . Carotenoids are organic pigments that occur naturally in plant chromoplasts. Less than 10% of the 563 carotenoids known to science can be synthesized into vitamin A in the body.

Vitamin A is a fat-soluble vitamin. This is the name for a group of vitamins, for the absorption of which the body requires the intake of dietary fats, oils or lipids. These include, for example, cooking oils, nuts, fish, meat, avocados.

Dietary vitamin A supplements often come in the form of oil-filled capsules to ensure the vitamin is fully absorbed by the body. People who don't eat enough dietary fat are more likely to be deficient in fat-soluble vitamins. Similar problems can occur in people with poor fat absorption. Fortunately, fat-soluble vitamins are found naturally in foods that contain fat. Thus, with a nutritious diet, deficiency of such vitamins is rare.

In order for vitamin A or carotene to enter the blood in the small intestine, it is necessary that they, like other fat-soluble vitamins, combine with bile. If the food at this moment contains little fat, then little bile is secreted, which leads to malabsorption and loss of up to 90 percent of carotene and vitamin A in feces.

Approximately 30% of beta-carotene is absorbed from plant foods, approximately half of beta-carotene is converted into vitamin A. From 6 mg of carotene in the body, 1 mg of vitamin A is formed, therefore the conversion factor of the amount of carotene into the amount of vitamin A is 1:6.

### **Beneficial properties of vitamin A**

Vitamin A performs several functions in the body. The most famous is its effect on vision. Retinyl ester is transported to the retina, which is located inside the eye, where it is processed into a substance called 11-cis-retinal. Next, 11-cis-retinal ends up in the rods (one of the photoreceptors), where it combines with the protein opsin and forms the visual pigment "rhodopsin". Rods containing rhodopsin can detect even very small amounts of light, making them essential for night vision. Absorption of a photon of light catalyzes the transformation of 11-cis-retinal back to all-trans-retinal and results in its release from the protein. This sets off a chain of events leading to the generation of an electrochemical signal to the optic nerve, which is processed and interpreted by the brain. The lack of retinol available to the retina results in impaired dark adaptation known as "night blindness".

Vitamin A in the form of retinoic acid plays an important role in the regulation of gene expression. Once retinol is taken up by a cell, it can be oxidized to retinal, which is oxidized to retinoic acid. Retinoic acid is a very potent molecule that binds to various nuclear receptors to initiate or inhibit gene expression. Through the regulation of the expression of specific genes, retinoic acid plays an important role in cell differentiation, one of the most important physiological functions.

Vitamin A is needed for the normal functioning of the immune system. Retinol and its metabolites are needed to maintain the integrity and functioning of skin cells and mucous membranes (respiratory, digestive and urinary systems). These tissues serve as a barrier and are the body's first line of defense against infections. Vitamin A plays a central role in the development and differentiation of white blood cells, lymphocytes, which are key agents in the immune system response.

Vitamin A is essential during embryonic development, being directly involved in the growth of limbs, the formation of the heart, eyes and ears of the fetus. In addition to this, retinoic acid affects the expression of the gene responsible for growth hormone. Both a deficiency and an excess of vitamin A can cause birth defects.

Vitamin A is used for the normal process of stem cells developing into red blood cells. In addition, vitamin A probably improves the mobilization of iron from reserves in the body, directing it to the developing red blood cell. There, iron is included in hemoglobin, the oxygen carrier in red blood cells. Vitamin A metabolism is thought to interact with zinc and iron in several ways. Zinc deficiency may result in decreased amount of retinol transported, decreased release of retinol in the liver, and decreased conversion of retinol to the retina. Vitamin A supplements have a beneficial effect on iron deficiency (anemia) and improve iron absorption among children and pregnant women. The combination of vitamin A and iron appears to treat anemia more effectively than supplemental iron or vitamin A alone.

Recent studies have shown that vitamin A, carotenoids, and provitamin A carotenoids may be effective antioxidants in preventing the development of heart disease. The antioxidant activity of vitamin A and carotenoids is provided by the hydrophobic chain of polyene units, which can quench singlet oxygen (molecular oxygen with higher activity), neutralize thiyl radicals, and stabilize peroxy radicals. Briefly, the longer the polyene chain, the higher the stability of the peroxy radical. Because of their structure, vitamin A and carotenoids can be oxidized when O<sub>2</sub> tension increases and are thus the most effective antioxidants at low oxygen tensions, which are typical of the physiological levels found in tissues. Overall, epidemiological evidence suggests that vitamin A and carotenoids are important dietary factors for reducing the incidence of heart disease.

The European Food Safety Authority (EFSA), which provides scientific advice to policymakers, has confirmed that the following health benefits have been observed from consuming vitamin A:

- normal cell division;
- normal development and functioning of the immune system;
- maintaining the normal condition of the skin and mucous membranes;
- maintaining vision;
- normal iron metabolism.

Vitamin A has a high compatibility with vitamins C and E and the minerals iron and zinc. Vitamins C and E protect vitamin A from oxidation. Vitamin E increases the absorption of vitamin A, but only in cases where vitamin E is consumed in small amounts. High levels of vitamin E in the diet, in turn, impair the absorption of vitamin A. Zinc helps the absorption of vitamin A by taking part in its conversion to retinol. Vitamin A enhances the absorption of iron and affects the use of iron reserves present in the liver.

Vitamin A also combines well with vitamins D and K2, magnesium and dietary fat. Vitamins A, D and K2 work synergistically to support immune health, promote adequate growth, maintain bone and tooth health, and protect soft tissue from calcification. Magnesium is essential for the production of all proteins, including those that interact with vitamins A and D. Many of the proteins involved in vitamin A metabolism and the receptors for both vitamins A and D function correctly only in the presence of zinc [10,11].

Vitamins A and D also work together to regulate the production of certain vitamin-dependent proteins. Once vitamin K activates these proteins, they help mineralize bones and teeth, protect arteries and other soft tissues from abnormal calcification, and protect against cell death.

Products containing vitamin A are best consumed with foods that contain “healthy” fat. For example, spinach, which has a high content of vitamin A and lutein, is recommended to be combined with avocado. The same goes for lettuce and carrots, which pair well with avocados in salads. As a rule, animal products rich in vitamin A already contain a certain amount of fat sufficient for its normal absorption. As for vegetables and fruits, it is recommended to add a small amount of vegetable oil to salad or freshly squeezed juice - this way we will be sure that the body will receive the necessary vitamin in full. [8]

It is worth noting that the best source of vitamin A in particular, as well as other beneficial substances, is a balanced diet and natural foods, rather than dietary supplements. When taking vitamins in medicinal form, it is very easy to make a mistake with the dosage and get more than the body needs. And an excess of a particular vitamin or mineral in the body can have very serious consequences. The risk of developing cancer may increase, the general condition of the body may deteriorate, metabolism and the functioning of organ systems may be disrupted. Therefore, the use of vitamin tablets should be carried out only when necessary and after consultation with a doctor.

### **Application in medicine**

Consumption of large amounts of vitamin A is prescribed in the following cases:

- for vitamin A deficiency, which can occur in people with protein deficiency, diabetes, an overactive thyroid, fever, liver disease, cystic fibrosis, or an inherited disorder called abetalipoproteinemia.

- for breast cancer. Premenopausal women with a family history of breast cancer who consume high levels of vitamin A in their diet are thought to reduce their risk of developing breast cancer. It is not known whether taking vitamin A as a dietary supplement has a similar effect.
- with cataracts. Research shows that a high intake of vitamin A in the diet leads to a reduced risk of developing cataracts.
- for diarrhea caused by HIV. Taking vitamin A along with conventional medications appears to reduce the risk of death from diarrhea in HIV-infected children with vitamin A deficiency.
- for malaria. Taking vitamin A orally reduces symptoms of malaria in children under 3 years of age in areas where malaria is common.
- with measles. Taking vitamin A orally reduces the risk of complications or death from measles in children with measles and vitamin A deficiency.
- for precancerous lesions in the mouth (oral leukoplakia). Research shows that taking vitamin A may help treat precancerous lesions in the mouth.
- during recovery after laser eye surgery. Taking vitamin A orally along with vitamin E improves healing after laser eye surgery.
- for complications after pregnancy. Taking vitamin A reduces the risk of diarrhea and fever after pregnancy in undernourished women.
- for complications during pregnancy. Taking vitamin A orally reduces the risk of death and night blindness during pregnancy in women with poor nutrition.
- for eye diseases affecting the retina (retinitis pigmentosa). Research shows that taking vitamin A may slow the progression of eye diseases that cause damage to the retina.

The pharmacological form of vitamin A can vary. In medicine, it is found in the form of dragees, drops for internal administration, drops for oral administration in oil form, capsules, an oil solution for intramuscular administration, an oil solution for oral administration, and in the form of film-coated tablets. Vitamin A is taken for prevention and medicinal purposes, usually 10-15 minutes after meals. Oil solutions are taken in case of impaired absorption into the gastrointestinal tract or in severe cases of the disease. In cases where long-term treatment is necessary, the solution for intramuscular injection is combined with capsules. In pharmacology, the amount of vitamin A is often indicated in International Units (International Units). units). For mild and moderate avitaminosis, adults are prescribed 33 thousand International Units per day; for hemeralopia, xerophthalmia - 50-100 thousand IU/ day; children - 1-5 thousand IU / day, depending on age; for skin diseases in adults - 50-100 thousand IU/ day; children - 5-20 thousand IU/ day.

Traditional medicine advises using vitamin A as a remedy for flaky and unhealthy skin. To do this, it is recommended to consume fish oil, liver, butter and eggs, as well as vegetables rich in vitamin A - pumpkin, apricot, carrots. A good way to replenish the deficiency is freshly squeezed carrot juice with the addition of cream or vegetable oil. Another folk remedy for obtaining the vitamin is considered to be a decoction of tubers of the tall belly - it is used as a tonic, restorative and antirheumatic agent. Also a valuable source of vitamin A, as well as other useful substances, are flax seeds, which are consumed internally and as part of external masks, ointments and decoctions. According to some reports, a high amount of vitamin A is contained in carrot tops, even more than in the fruit itself. It can be used in cooking, as well as make a decoction, which is used internally as a course for a month<sup>[4]</sup>.

### **Latest Scientific Research on Vitamin A:**

Researchers at Case Western Reserve University School of Medicine have found that uncontrolled vitamin A metabolism in the gut can cause dangerous inflammation. The discovery establishes a link between diet composition and the inflammatory diseases Crohn's disease and inflammatory bowel syndrome.

Researchers have found a branch point in the vitamin A metabolic pathway that depends on a specific protein called ISX. The beginning of the journey is beta-carotene, a pigmented, highly nutritious substance responsible for the color of sweet potatoes and carrots. Beta-carotene is transformed into vitamin A in the digestive tract. From there, the largest proportion of vitamin A is delivered to other tissues, ensuring good vision and other important functions. When studying mice that had ISX removed, scientists noticed that this protein helps the body balance this process. Protein helps the small intestine determine how much beta-carotene is needed to meet the body's need for vitamin A. Immune cells rely on this control mechanism to properly respond to foods entering the small intestine. This provides an effective barrier against potential food hazards. Researchers have found that when ISX is missing, immune system cells in the digestive tract begin to overreact to a beta-carotene-rich diet. Their results prove that ISX is a major link between what we eat and gut immunity. The scientists concluded that removing the ISX protein accelerates the expression of the gene that converts beta carotene to vitamin A by 200 times. Because of this, mice with deleted ISX received an excess of vitamin A and began to convert it into retinoic acid, a molecule that regulates the activity of many genes, including those that form immunity. This caused localized inflammation as immune cells filled the area in the intestines between the stomach and colon and began to multiply. This severe inflammation spread to the pancreas and caused immunodeficiency in mice <sup>[5]</sup>.

Recent research shows that vitamin A increases the activity of  $\beta$ -cells that produce insulin. Scientists have discovered that beta cells that produce insulin have a high number of receptors on their surface that are sensitive to vitamin A. The researchers believe that the reason for this is that vitamin A plays an important role in the development of beta cells in the early stages of life, as well as for proper functioning throughout the rest of life, especially during pathophysiological conditions - that is, in some inflammatory diseases.

To study the importance of vitamin A in diabetes, the researchers worked with insulin cells from mice, healthy people, and people with type 2 diabetes. Scientists blocked the receptors in fragments and gave patients some sugar. They saw that the cells' ability to secrete insulin was deteriorating. The same trend could be observed when comparing insulin cells from donors with type 2 diabetes. Cells from patients with type 2 diabetes were less able to produce insulin compared to cells from people without diabetes. Scientists have also discovered that beta cells' resistance to inflammation is reduced in the absence of vitamin A. When there is no vitamin A at all, the cells die. This research may also have implications for some types of type 1 diabetes, where beta cells are poorly developed in the early stages of life. "As it became clear after studies with animals, newborn mice need vitamin A for the full development of their beta cells. We are almost sure that similar things happen in humans. Children need to get the right amount of vitamin A in their diet," said Albert Salehi, senior researcher at the Diabetes Center at Lund University in Sweden <sup>[6]</sup>.

Scientists from Lund University in Sweden have discovered a previously unexplored effect of vitamin A on human embryonic development. Their research demonstrates that vitamin A has an effect on the formation of blood cells. A signaling molecule known as retinoic acid is a derivative of vitamin A that helps determine how different types of tissue will form in a growing fetus.

Read more

Unprecedented research from the laboratory of Professor Niels-Bjarne Woods at the Lund Cell Center Stam in Sweden showed the effect of retinoic acid on the development of red blood cells, white blood cells and platelets from stem cells. In laboratory conditions, stem cells were influenced by certain signaling molecules, transforming into hematopoietic cells. Scientists have noticed that high levels of retinoic acid rapidly reduce the number of blood cells produced. The reduction in retinoic acid, in turn, increased blood cell production by 300%. Despite the fact that vitamin A is necessary for the normal course of pregnancy, it has been established that excess vitamin A harms the embryo, introducing the

risk of developing malformation or stopping pregnancy. In view of this, pregnant women are strongly advised to control the consumption of foods containing large amounts of vitamin A in the form of retinoids, such as liver. "The results of our study show that vitamin A in large quantities has a negative effect on hematopoiesis. This suggests that pregnant women should additionally avoid excessive intake of vitamin A," says Nils-Bjarne Woods<sup>[7]</sup>.

### **Vitamin A in cosmetology**

This is one of the main components that ensure healthy and toned skin. When you receive a sufficient amount of vitamin, you can forget about problems such as skin laxity, age spots, acne, dryness.

Vitamin A in pure, concentrated form can be easily found in pharmacies, in the form of capsules, oil solutions and ampoules. It is worth remembering that this is a fairly active component, so it should be used with caution, and preferably after 35 years. Cosmetologists advise making masks containing vitamin A during the cold season and once a month. If there are contraindications to the use of pharmaceutical vitamin A in masks, you can replace it with natural products that are rich in this vitamin - viburnum, parsley, spinach, egg yolks, dairy products, pumpkin, carrots, fish oil, algae.

There are many recipes for masks with vitamin A. They often contain fat-containing substances - olive oil, fatty sour cream, burdock oil. Vitamin A (oil solution and retinol acetate) has good compatibility with aloe juice, oatmeal and honey. To eliminate expression lines and bruises under the eyes, you can use a mixture of vitamin A and any vegetable oil, or the drug Aevit, which already contains both vitamin A and vitamin E. A good preventive and therapeutic remedy for acne is a mask with ground lentils, vitamin A in an ampoule or a small amount of zinc ointment, applied 2 times a month. If you have allergic reactions, open wounds, damaged skin, or any skin diseases, you should refrain from using such masks.

Vitamin A is also good for healthy nails when mixed with other ingredients. For example, you can prepare a hand mask with liquid vitamins A, B and D, rich hand cream, coconut oil, lemon juice and a drop of iodine. This mixture should be applied to the skin of the hands and nail plates, massaged for 20 minutes and left to absorb. Regularly performing this procedure will improve the condition of your nails and hands.

The impact of vitamin A on the health and beauty of hair should not be underestimated. It can be added to shampoos (immediately before each procedure, to avoid oxidation of the substance when adding it to a whole package of shampoo), to masks - to increase the shine and softness of the hair. As in facial masks, vitamin A is recommended to be combined with other ingredients - vitamin E, various oils, decoctions (chamomile, horsetail), starch (for softness), mustard or pepper (to accelerate hair growth). These products should be used with caution by those who are allergic to pharmaceutical vitamin A and those whose hair is prone to excessive oiliness.

### **Vitamin A in animal, plant and industrial production**

Found in green grass, alfalfa and some fish oils, vitamin A, otherwise known as retinol, is one of the nutrients essential to poultry health. Vitamin A deficiency leads to poor plumage along with weakness, problems with the eyes and beak, even their damage. Another important factor for production is that lack of vitamin A can slow growth.

Vitamin A has a relatively short shelf life and, as a result, dry foods stored for extended periods of time may not contain sufficient amounts of the vitamin. After illness or stress, birds' immune systems are very weak. By adding a short course of vitamin A to the feed or water, further disease can be prevented, as without sufficient vitamin A birds are susceptible to a number of harmful pathogens.

Vitamin A is also necessary for healthy growth of mammals, maintaining good appetite, coat condition and immunity.

### **Interesting facts about vitamin A**

- it is the first vitamin discovered by man;
- Polar bear liver is so rich in vitamin A that eating a whole liver can be fatal to humans;
- An estimated 259 to 500 million children lose their vision each year due to vitamin A deficiency;
- in cosmetics, vitamin A is most often found under the names retinol acetate, retinyl linoleate and retinyl palmitate;
- Vitamin A-fortified rice, developed about 15 years ago, could prevent hundreds of thousands of cases of blindness in children. But due to concerns about genetically modified foods, it was never put into production.

### **Dangerous properties of vitamin A, its contraindications and warnings**

Vitamin A is quite resistant to high temperatures, but is destroyed in direct sunlight. Therefore, it is necessary to store foods rich in vitamins, as well as medical nutritional supplements, in a dark place.

### **Signs of Vitamin A deficiency**

Vitamin A deficiency usually occurs due to insufficient intake of foods high in vitamin A, beta-carotene, or other provitamin A carotenoids ; which are metabolized into vitamin A in the body. In addition to dietary problems, excess alcohol consumption and malabsorption may cause vitamin A deficiency.

The earliest sign of vitamin A deficiency is blurred vision in the dark, or night blindness. Severe or long-term vitamin A deficiency causes changes in corneal cells that eventually lead to corneal ulcers. Vitamin A deficiency among children in developing countries is a leading cause of blindness.

Vitamin A deficiency is also associated with immunodeficiency, reducing the ability to fight infections. Even mildly deficient vitamin A children have a higher incidence of respiratory illnesses and diarrhea, as well as higher mortality rates from infectious diseases (especially measles), compared with children who consume adequate amounts of vitamin A. In addition, vitamin A deficiency can cause disorders growth and bone formation in children and adolescents. In smokers, a lack of vitamin A may contribute to the development of chronic obstructive pulmonary disease (COPD) and emphysema, which are thought to increase the risk of lung cancer.

### **Signs of excess Vitamin A**

Acute vitamin A hypervitaminosis, caused by very high doses of retinol , which is rapidly absorbed and slowly eliminated from the body, is relatively rare. Symptoms include nausea, headache, fatigue, loss of appetite, dizziness, dry skin and swelling of the brain. There are studies that prove that long-term excess vitamin A in the body can lead to the development of osteoporosis. Some synthetic retinol derivatives (eg, tretinat , isotretinoin , tretinoin ) can cause defects in the embryo, and therefore should not be used during pregnancy or when trying to conceive. In such cases, beta-carotene is considered the safest source of vitamin A.

Findings from the Beta-Carotene and Retinol Effectiveness Trial (CARET) suggest that long-term use of vitamin A ( retinol ) and beta-carotene should be avoided in the long term for people at high risk of developing lung cancer, such as smokers and people exposed to asbestos.

## Interaction with other drugs

Vitamin A, which has already entered the blood, begins to quickly break down if the body lacks vitamin E. And if there is a lack of vitamin B4 (choline), then vitamin A is not stored for future use. Antibiotics are thought to slightly reduce the effects of vitamin A. Vitamin A may also increase the effects of a substance called isotretinoin and lead to severe side effects.

We have collected the most important points about vitamin A in this illustration and will be grateful if you share the picture on a social network or blog with a link to this page:

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[The HTML version of the article](#) is available on the foodplus.info website.

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