



### **Blackcurrant (lat. *Ribes nigrum*)**

*Eliseeva Tatyana*, editor-in-chief of the project [EdaPlus.info](http://EdaPlus.info)

*Yampolsky Alexey*, nutritionist

Email: [eliseeva.t@edaplus.info](mailto:eliseeva.t@edaplus.info), [yampolsky.a@edaplus.info](mailto:yampolsky.a@edaplus.info)

**Abstract.** The article discusses the main properties of blackcurrant and its effect on the human body. A systematic review of modern specialized literature and relevant scientific data was carried out. The chemical composition and nutritional value of the product are indicated, the use of blackcurrant in various types of medicine and the effectiveness of its use in various diseases are considered. The potentially adverse effects of black currant on the human body under certain medical conditions and diseases are analyzed separately. The scientific foundations of diets with its application are considered.

**Key words:** blackcurrant, benefits, harm, beneficial properties, contraindications

### **Beneficial features**

Table 1. Chemical composition of black currant (according to [Food+](#)).

Main substances (g / 100 g):	Fresh blackcurrant <sup>[1]</sup>
Water	81.96
Carbohydrates	15.38
Squirrels	1.4
Fats	0.41
Calories (kcal)	63
Minerals (mg/100 g):	
Potassium	322
Phosphorus	59
Calcium	55
Magnesium	24
Sodium	2
Iron	1.54
Zinc	0.27
Manganese	0.256
Copper	0.086

<b>Vitamins (mg/100 g):</b>	
Vitamin C	181
Vitamin E	one
Vitamin PP	0.3
Vitamin B6	0.066
Vitamin B2	0.05
Vitamin B1	0.05

In the composition of blackcurrant berries, vitamin C is usually called the “main” useful component. By its amount, blackcurrant falls into the Top 10 list of plant vitamin sources. Only 20 grams of berries are enough to provide the daily requirement of an adult for ascorbic acid, and in unripe fruits it is even more than in ripe ones. The concentration of this vitamin is even higher in buds (up to 450 mg/100 g) and leaves of the plant (up to 470 mg/100 g after flowering) <sup>[2]</sup>. There is also a lot of it in flowers and buds, so in folk medicine there are recipes with all the listed parts of the plant. The amount of ascorbic acid depends on weather conditions (in a dry hot period it decreases by about 25-30%), on the region (in the northern cold regions there is more vitamin C in berries) and on other factors.

Among the minerals, there are quite a lot of potassium in the berries (about 13-15% of the daily requirement) and iron (about 9-10% of the d.p.). Fruits accumulate zinc, copper, selenium. But black currant shows its healing effects not only due to the presence of some individual components.

Often, researchers talk about a synergistic effect, which is manifested due to a complex of substances that systemically enhance each other's actions. Therefore, scientists pay special attention to the content of carotene, phenylalanine, citric, malic and other organic acids, glycosides, anthocyanins (cyanidin, delphinidin), tannins and pectin substances, essential oils and various sugars (glucose, fructose, etc.) in berries.

### **Medicinal properties**

Blackcurrant phytochemicals exhibit varying degrees of antimicrobial, neuroprotective, hypotensive, immunomodulatory, diaphoretic effects, as well as potent anti-radiation, antioxidant, and anti-inflammatory properties that may be beneficial in cancer prevention and treatment. Currant substances show the potential to improve overall human health, especially in diseases associated with inflammation and regulation of blood glucose levels. In addition, blackcurrant extracts have the ability to inhibit low-density lipoprotein and reduce the risk of cardiovascular disease.

The medicinal properties of blackcurrant are demonstrated so far, mainly in experiments "in vitro" on cellular material (in vitro) and on laboratory animals. But even these experiments lead researchers to promising conclusions and assumptions:

- An anthocyanin-rich blackcurrant extract could possibly inhibit the growth of human hepatocellular carcinoma cells. Moreover, an aqueous extract of berry peel showed an even more pronounced cytotoxic effect on HepG2 human liver cancer cells than berry pulp anthocyanin aglycones. <sup>[3]</sup>
- Blackcurrant consumption attenuates liver inflammation and lipopolysaccharide-stimulated inflammatory responses of splenocytes (spleen tissue monocyte cells) in obese mice <sup>[4]</sup>. Extract supplementation reduces obesity-induced inflammation in adipose tissue and splenocytes, at least in part, by modulating energy metabolism in skeletal muscle. <sup>[5]</sup>
- Blackcurrant extracts may improve postprandial ("after eating") glycemic control in type 2 diabetics through the antilucosidase activity of the plant's polyphenols. <sup>[6]</sup>

- Wild blackcurrant leaf extract inhibits influenza A virus in vitro and in mice. The extract interferes with the attachment and penetration of the virus into the cell, and the secondary metabolites of the plant are able to inhibit the replication of the influenza virus through interference with the synthesis of hemagglutinin, reduce the expression level of an inflammatory cytokine, prevent interaction with the cell membrane, etc. This gives hope for the development of a drug or a therapeutic strategy for prevention of infection and spread of the virus at an early stage. <sup>[7]</sup> Even earlier, the fruit extract was found to have antiviral activity against influenza A and B viruses and herpes simplex virus. <sup>[eight]</sup>
- The use of drugs based on black currant polysaccharides may be used in the treatment of atopic dermatitis (inflammation that causes dry skin and impaired skin barrier function). It is still far from the creation of a drug, but in experiments on laboratory mice, the currant drug had a diverse effect on the immune system (suppressed the migration of mast cells into the skin of the epidermis and hyperproduction of immunoglobulin E) and generally alleviated the symptoms of atopic dermatitis. <sup>[9]</sup>
- Berry extract in combination with cyanidin-3-O-glucoside may be promising candidates for the development of new treatments for smoking-induced periodontal disease. This is due to the fact that currant extract neutralizes the cytotoxic effect of nicotine on epithelial cells and fibroblasts <sup>[10]</sup>
- Blackcurrant juice can cause a significant and dose-dependent decrease in blood pressure and heart rate. So far, this has been found with intravenous juice and in animal experiments, but the results allow a better understanding of the mechanism of hypotension. <sup>[eleven]</sup>

The effect of black currant on the functionality of the organs of the gastrointestinal tract is being actively studied:

- Plant anthocyanins are able to regulate the gut microbiome, as confirmed by experiments on mice. True, only long-term use of berry supplements has a significant effect, and only in young mice. But even such results open up prospects for the creation of programs for the treatment of the gastrointestinal tract with the help of diets <sup>[12]</sup>. There are already projects investigating the positive effects of blackcurrant extract powder on the human colon microbiome to reduce the risk of cancer.
- Blackcurrant juice has an antispasmodic effect on the smooth muscles of the gastrointestinal tract (in vitro), so that common gastrointestinal disorders may be treated with a currant supplement without resorting to medication. <sup>[13]</sup>
- Arabinogalactan protein isolated from plant seeds moderately prevents *Helicobacter pylori* from sticking to the walls of the stomach (in the experiment on sections of the mucous membrane), which can potentially be used in the treatment of gastritis and peptic ulcer. <sup>[fourteen]</sup>

Studies are also underway on the extent to which blackcurrant antioxidants are able to stop pathological tissue growth, exhibiting antiproliferative activity on the material of tumor cell lines of mouse melanoma, ovarian cancer, and cervical cancer. The diuretic and salt-removing (saluretic) properties of different volumes of blackcurrant ethanol extracts are being studied, since data on the effect of preparations of this berry on the excretory function of the kidneys are still contradictory, and the nature of the effect probably depends on the dosage. <sup>[fifteen]</sup>

Some studies have shown the medicinal effects of blackcurrant in human experimental programs. For example, it was found that:

- currant juice reduces the effect of oxidative and inflammatory biomarkers in cultured macrophages in patients with a tendency to atherosclerosis. <sup>[16]</sup>

- Blackcurrant anthocyanins as a dietary supplement to the main treatment inhibit the progression of glaucoma <sup>[17]</sup>, and reduce intraocular pressure in both patients with glaucoma and healthy people <sup>[18]</sup>,
- the use of blackcurrant before smoking significantly reduces the negative impact of tobacco smoke on the immunological status of saliva, and, accordingly, the risks of oral diseases.

In voicing the results of the work, the researchers very clearly describe the conditions of the experiment and the characteristics of the group of patients in which the therapeutic effect of black currant was noticed, because when the given conditions change, the effects may weaken or even disappear. But in general, the results of the research show how much healing potential is contained in both the berries and the leaves of the plant.

### **Use in medicine**

Blackcurrant fruits are produced as a medicinal product, which, according to indications, is intended for the treatment of gastrointestinal diseases, atherosclerosis, colds, asthenia (a pathological condition of rapidly occurring fatigue), cardiovascular diseases and periodontal disease.

Blackcurrant berries, along with rose hips in a 50/50 ratio, are included in Vitamin Collection No. 1. It is prescribed for beriberi (lack of vitamins A, C, P, K). Brewed infusion is recommended to drink 100 ml 3-4 times a day.

Currant fruits are also part of the complex herbal preparations Travohol (where currant berries are one of the main components of the product), Nevrosin, Gerboton and many others:

- The pharmacological action of the Travohol elixir involves its use mainly as a choleretic agent (stimulating the formation and secretion of bile) in therapy for violations of the outflow of bile according to the hypokinetic type and in the treatment of chronic non-calculous cholecystitis. Among the concomitants are antioxidant, anti-inflammatory, membrane-stabilizing and antispasmodic effects. There is also a bacteriostatic effect of the drug against the bacteria *Escherichia coli*, *Streptococcus faecalis*, *Staphylococcus aureus*.
- Tablets "Nevrosina", according to the instructions, are used for physical and mental fatigue, neuroses, depression, diseases of the cardiovascular system, autonomic disorders, spasms of smooth muscles, menopausal syndrome.
- Gerboton tincture is positioned as a general tonic to increase physical and mental activity during recovery periods.

The leaves of the plant are used in complex plant bioadditives "Phytoline No. 24 Adaptofit map", "Fitolann No. 11 Urofit map", "Anti-alcohol-biol extract", "Cirrofit", etc. Foreign manufacturers produce a number of dietary supplements based on blackcurrant berries and seeds (one of the most common forms are capsules). Among these effects are the prevention of problems of the cardiovascular system and disorders of visual function, reducing the intensity of menstrual pain, improving the condition of the joints, etc.

### **In folk medicine**

In folk medicine of those countries where blackcurrant is traditionally considered a medicinal raw material, it is almost universally used to treat colds, respiratory diseases, urinary system organs and joints. But there is also a regional specificity of the use of medicinal berries.

- In Central Asia, blackcurrant berries and leaf decoctions are used to treat gastritis, anemia, and diabetes. Berry and leafy decoctions are taken to normalize the digestive tract and stop

vomiting. Leafy "teas" (which are brewed similarly to tea leaves) are drunk as a laxative, diuretic, and diaphoretic. Decoctions of the leaves when taking a bath relieve pain in the joints and muscles, help in the treatment of furunculosis. In mountainous areas, blackcurrant is used to treat skin tuberculosis.

- Bulgarian folk healers recommend drinking an infusion of currant leaves for rheumatic pains. In combination with white wine, such an infusion is prescribed for weakness of the stomach.
- In the folk medicine of Belarus, blackcurrant berries are a popular product for the treatment of liver and heart diseases, as well as for restoring the functions of the nervous system. For gastritis characterized by low acidity, currant juice is used (50-70 ml 2-3 times a day). With diathesis and skin tuberculosis, baths are taken with the addition of a decoction of the branches of the plant.
- Russian folk therapy uses currant juice as a remedy for beriberi and colds, and tea from the leaves to relieve symptoms of rheumatism and relieve inflammation of the bladder and kidneys.

All East Slavic peoples have a common practice of using blackcurrant to lower blood pressure, as well as get rid of headaches of vascular and neurogenic origin. Moreover, for therapeutic purposes, berries simply ground with sugar are often used. Such a "dessert" for 1-2 tbsp. l. daily consumed with tea, instead of jam, a long course (from 1 month and, as a rule, until the end of currant stocks). According to supporters of traditional medicine, in addition to a gradual decrease in the intensity of headaches with such therapy, meteorological dependence disappears (health does not deteriorate even with a sharp change in weather), insomnia ceases to torment, memory improves, energy and strength appear.

But more often, in folk therapy, they use fresh juice or blackcurrant berries without added sugar. In this form, currant products are more useful for various diseases of the digestive system: gastritis with low acidity, inflammation of the gastric mucosa, diarrhea, colic, diabetes, excess uric acid in the body. It is advisable to rinse the oropharynx with sore throat and stomatitis with juice with water without adding sugar.

Some sources devoted to the treatment of folk methods mention blackcurrant as a means of enhancing male sexual function. Sometimes blackcurrant is used as an aid in the fight against cancer.

### Decoctions and infusions

For medicinal purposes in folk therapy, decoctions and infusions of fruits, leaves, flowers, branches and roots of the plant are used. From the coarse parts of the currant (branches and roots), decoctions are most often prepared for bathing procedures for diathesis, rickets, rheumatism, skin tuberculosis at the rate of 1 part of the decoction per 1000 parts of water. From the tender parts, preparations are prepared for internal use:

- **Currant tea from buds and flowers.** It is used in folk therapy for joint pain of various nature (arthritis, rheumatism, osteochondrosis), prostatitis and urolithiasis. Medicinal "tea" is prepared from buds and flowers collected in early spring. Dry raw materials (2 tsp) are poured with boiling water (250-300 ml) and infused in a teapot under the lid for 20-30 minutes. One such teapot should be enough for a day. In total, the course of treatment lasts from one and a half to three months, but every three weeks a 5-7-day break is made.
- **A decoction of dried fruits.** Recommended for colds, high blood pressure, swelling. Dry berries (3 tablespoons) are poured with water (500 ml) and first kept on low heat for about 5 minutes, and then infused for an additional hour. After straining, the decoction is drunk half a glass during the day 4-5 times. A whole glass of broth is drunk immediately if necessary to bring down the heat.
- **Infusion of fresh young leaves.** Vitamin fortifying "energy" drink is prepared from the spring leaves of the plant, which are poured with equal parts of boiled water and sour fruit juice (in

the approximate proportion of 50 g of leaves per 1 liter of liquid). "Cocktail" is infused for a day, filtered and taken half a glass a day. To improve the taste, it can be slightly sweetened.

- **Infusion of dry leaves.** A diuretic drink for pyelonephritis, cystitis, urolithiasis is prepared from crushed blackcurrant leaves (5-6 tablespoons), which are steeped in boiling water (1 l) for 1 hour in a hermetically sealed container. The infusion should be taken 5 times a day, 200-250 ml. with a spoonful of honey or sugar.

### **In scientific research**

Listing the medicinal properties, we have already referred to various studies of derivatives of blackcurrant fruits and leaves. Most of these projects, in which the anti-radiation, antimicrobial, immunomodulatory, hypotensive, neuroprotective, antioxidant, anti-inflammatory and other properties of the plant were studied, were carried out in laboratories "in test tubes" or on experimental animals. But the more valuable and illustrative are the relatively rare studies involving people. Examples of such work are given below.

**Blackcurrant berries and its nectars optimize the metabolic reactions of the postprandial system to sucrose. As a result, there was a delay in the digestion of sucrose and a slower absorption of glucose.** <sup>[19]</sup>

This randomized controlled cross-over study involved 20 healthy women who consumed whole berries or their nectar (300 ml) supplemented with 35 g sucrose. The glucose, insulin, and free fatty acid responses of the berry diet group were compared with those of the group that ate the same amount of sucrose without the berry supplement.

Despite the higher content of available carbohydrate in the berry and nectar food due to natural currant sugar, the concentration of glucose and insulin in the participants of the "berry group" decreased during the first 30 minutes. In addition, the levels of these indicators grew more slowly during the second hour. Overall, women on the berry diet had a significant improvement in their glycemic profile. And this suggested that blackcurrant can slow down digestion and reduce the absorption of sucrose and thereby suppress postprandial glycemia.

**The consumption of blackcurrant before smoking improves the immunological status of saliva and the rate of salivation in healthy smokers, partially leveling the negative effects of tobacco smoke.** <sup>[twenty]</sup>

In the study, the researchers first measured the rate of salivation and the level of secretion of immunoglobulin A in the saliva of healthy smokers 5 minutes, half an hour and an hour after smoking. And then they measured the same indicators after eating 100 g of berries and smoking.

In the "smoking without currant" group, an hour-delayed effect of reducing the rate of salivation was observed, while in the "currant + smoking" group, it was not observed. At the same time, in the second group, a significant decrease in the concentration of the level of secretion of immunoglobulin A was observed after a 5-minute interval, with a further increase in indicators after 60 minutes.

The researchers believe that the use of blackcurrant before smoking significantly reduces the effect of tobacco smoke on salivation, the physicochemical properties of saliva, the biological activity of its components, including salivary immunoglobulin A. But they emphasize that the best strategy in the prevention of chronic diseases would be complete smoking cessation.

**Blackcurrant extract powder positively affects the gut microbiome and risk markers for colon cancer in humans.** <sup>[21]</sup>

The study involved 30 healthy adult male and female volunteers who took two preparations based on blackcurrant extract powder (in the second case with lactoferrin and lutein). At the same time, scientists conducted fluorescent hybridization and analysis of populations of their fecal microbiota before and after taking the drugs.

The results showed that the use of currant extracts led to a significant increase in the population of lactobacilli and bifidobacteria, while the population of *Clostridium* spp. and *Bacteroides* spp was significantly reduced. Also, after the drugs, the pH of feces and the activity of  $\beta$ -glucuronidase (a bacterial enzyme that can increase the risk of developing colorectal cancer) decreased.

Based on this, the scientists concluded that blackcurrant extracts can act as prebiotic agents, increasing the number of beneficial bacteria (lactobacilli and bifidobacteria) in the intestine, and deactivating toxic bacterial enzymes involved in colon carcinogenesis.

In addition to those described, there is also a whole cluster of works on the material of the New Zealand berry, in which scientists, under different initial conditions, studied the ability of black currant to increase endurance and influence some other physiological characteristics in athletes. The conclusions of scientists cannot be called unambiguous, because the indicators depended on the type of load, age <sup>[22]</sup>, the degree of fitness of the subjects <sup>[23]</sup> and even on their ethnicity <sup>[24]</sup>. But all the results indicate that there is a certain “sporting” effect from taking blackcurrant, and in order to unlock the maximum potential, you only need to find and observe the optimal parameters and dosages when using a currant remedy.

## **Weight regulation**

The relatively low amount of calories (63 kcal / 100 g of berries) makes blackcurrant a popular product among supporters of berry diets. Delicious fruits help a person diversify the menu and provide a supply of important vitamins and minerals. But there is another mechanism that probably allows the berry to be used in the fight against extra pounds: under certain conditions, blackcurrant anthocyanins can help control weight gain, although their effect is not universal.

Thus, in the study described below <sup>[25]</sup>, the gastrointestinal distribution of blackcurrant anthocyanins and phenolic acid metabolites in overweight mice was studied. Animals with a microbiome artificially disturbed by antibiotics and healthy mice were compared. They found that daily consumption of a mixed low-fat, high-fat diet supplemented with 1% powdered blackcurrant extract for 8 weeks did reduce body weight gain and improve glucose metabolism, but only in mice with an intact gut microbiome. If the state of the microflora was disturbed, this effect was no longer observed.

But it turned out that with the help of some currant products, dysfunctions associated with obesity and its complications can be eliminated. So, using blackcurrant pomace extract, scientists in another experiment were able to improve the serum lipid profile and positively affect markers of insulin resistance and antioxidant status in laboratory rabbits fed a high-fat diet. <sup>[26]</sup>

## **In cooking**

The taste of blackcurrant berries can vary from sweet to sour with a lot of intermediate flavors. The fruits of the plant are more often eaten fresh (or defrosted), but sauces, jams, jelly, cookies, marmalade, marshmallow and jelly are often prepared from them, as well as alcoholic tinctures, wines and liqueurs. Plant buds are also used for syrups and liqueurs. In Russia, mash was traditionally prepared from blackcurrant.

In the cuisines of northern peoples, blackcurrant, like other berries, can be included in the recipe of national dishes. So in Estonia, Latvia, Sweden, Finland, a summer airy dish of semolina, blackcurrant and sugar is known. This semolina mousse has its own name in each country (in Estonia - mannavah, in Latvia - uzputenis, in Sweden - klappgröt), but it is prepared in approximately the same way.

Blackcurrant (at the rate of 300 g for 6 servings) is pressed to a dry cake, and the resulting juice is mixed with water (400 ml) and boiled for 10 minutes over medium heat. Sugar (250 g) is added to the strained broth, after which it is brought to a boil again. Semolina (100g) is poured into this hot liquid in a thin stream, which, with constant stirring, cook for about 10 minutes. After cooling, the currant-semolina mass is whipped with a mixer until it acquires an airy fluffy consistency and is sent to the refrigerator for 2-3 hours. This dish is usually served in bowls with whipped cream, milk, mint leaves.

However, in cooking, not only the taste is widely used, but also the strong aroma of the fruits and leaves of the plant, which is clearly felt due to the abundance of essential oils. For smell, leaves are added to preservation.

### **In cosmetology**

The strong currant smell made it possible to use the plant bud extract as an additive in the perfume industry. But especially often blackcurrant can be found in cosmetics as part of products for eliminating numerous dermatological problems of various nature: eczema, rosacea, pruritus, neurodermatitis, exudative diathesis, systemic scleroderma, psoriasis, lichen planus. In folk cosmetology, the juice of currant fruits is used externally to remove warts.

Currant remedies are also used to reduce the severity of vitiligo (a pathological condition associated with the disappearance of melanin in certain areas of the skin). At home, age spots and freckles are eliminated with a mask of mashed berries that can whiten the skin.

Blackcurrant masks in the "berry season" are used to prevent baldness and strengthen hair. In addition, recommendations on preventive lubrication of the nail plate and cuticles with currant juice are distributed on thematic sites to prevent fungal infections.

### **Dangerous properties of blackcurrant and contraindications**

When using blackcurrant, there are restrictions that apply to patients with thrombosis and increased blood clotting, patients with hepatitis, gastritis with high acidity, duodenal ulcers and / or stomach ulcers. It is not recommended to eat currant berries for people with a tendency to constipation.

Due to the very high content of phenylalanine, blackcurrant berries are contraindicated in patients with phenylketonuria (Felling's disease). This genetically determined congenital pathology leads to excessive accumulation of the amino acid (phenylalanine) and its metabolites, resulting in severe CNS damage. For the same reason, doctors can remove blackcurrants from the diet of pregnant women.

### **Selection and storage**

Berries of the typical form of black currant change color when ripe, passing through the red phase, gradually becoming darker. Therefore, the more black such a fruit is, the better. Although, in rare cases, berries of *Ribes nigrum* breeding forms can be caught, which, even when ripe, have a yellow, whitish or green color.

When there is an alternative, buyers usually choose a large berry. In some varieties, the diameter of the fruit can reach 2.5 cm, and the weight is 6-7 grams. But more often there are berries up to 1 cm on



sale. If they are harvested on time (before shedding), then even in such relatively small fruits all useful substances are preserved. And in order to surely buy a ripe, but not overripe blackcurrant, you can choose berries on green twigs. In addition, such fruits will be stored even longer.

It is important to always buy dry berries. It is also better to collect blackcurrants in dry weather. So she can lie at room temperature for 4-5 days. Otherwise, the crop will begin to deteriorate after 2 days. To extend this period to 2 weeks, currants are usually placed in a refrigerator in a glass dish with regular airing.

It is rather difficult to preserve ascorbic acid in blackcurrant fruits using "grandmother's ways". Exposure to high temperatures and oxygen during the preparation of such a popular "five-minute" jam destroys vitamin C, reducing its amount by more than 60%. Even remaining on the bush, overripe fruits begin to lose ascorbic acid. And 2 weeks after ripening, its amount in berries decreases by almost 70%.

Therefore, freezing is considered the best way to store blackcurrants. In one of the experiments of the Research Institute of Canning Technology, after checking first frozen, and after a while thawed berries, it turned out that there was a lot of ascorbic acid left there - about 110 mg / 100 g.

Before freezing, the fruits should be separated from the branches, washed, dried, frozen, and only then transferred to a glass or plastic container for long-term storage.

In our country, the fruits of black currant have always been not just a valuable culinary and food object. From generation to generation, the image of a medicinal berry has evolved, which can replace half of the "first aid kit". And it is not surprising that today we see how many of the hopes associated with the healing effects of blackcurrant are already being confirmed by scientists.

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### **Black currant - useful properties, composition and contraindications**

*Eliseeva Tatyana*, editor-in-chief of the project EdaPlus.info

*Yampolsky Aleksey*, nutritionist

*E-mail:* eliseeva.t@edaplust.info, yampolsky.a@edaplust.info

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**Abstract.** The article discusses the main properties of blackcurrant and its effect on the human body. A systematic review of modern specialized literature and relevant scientific data was carried out. The chemical composition and nutritional value of the product are indicated, the use of blackcurrant in various types of medicine and the effectiveness of its use in various diseases are considered. The potentially adverse effects of black currant on the human body under certain medical conditions and diseases are analyzed separately. Considered scientific basics diets With her application .