

Journal of Healthy Nutrition and Dietetics



In issue:



Peach



Blueberry



Melon



Blackberry



Bulgarian
pepper

A detailed description of
the useful, healing and
dangerous properties of
each product



Potassium



Ducan's diet

Table of contents

<i>Yampolsky A., Eliseeva T. Peach (Persicus)</i>	<i>2</i>
<i>Tarantul A., Eliseeva T. Blueberry (Vaccinium uliginosum)</i>	<i>14</i>
<i>Eliseeva T., Yampolsky A. Melon (Cucumis melo)</i>	<i>26</i>
<i>Yampolsky A., Eliseeva T. Blackberry (Rubus caesius)</i>	<i>37</i>
<i>Tarantul A., Eliseeva T. Bulgarian pepper (lat. Capsicum annuum)</i>	<i>47</i>
<i>Mironenko A., Eliseeva T. Potassium (K) - description, effect on the body, best sources</i>	<i>59</i>
<i>Tkacheva N., Eliseeva T. The Dukan Diet - scientific rationale, proven health benefits, advantages and disadvantages</i>	<i>70</i>



Peach (lat. *P. persicus*)

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

Yampolsky Alexey, nutritionist

Email: eliseeva.t@edaplust.info, yampolsky.a@edaplust.info

Abstract. The article discusses the main properties of peach 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 peach in various types of medicine and the effectiveness of its use in various diseases are considered. The potentially adverse effects of peach on the human body under certain medical conditions and diseases are analyzed separately. The scientific foundations of diets with its use are considered.

Keywords: peach, benefit, harm, beneficial properties, contraindications

Beneficial features

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

Main substances (g / 100 g):	Fresh Peach [1]
Water	88.87
Carbohydrates	9.54
Sugar	8.39
Alimentary fiber	1.5
Squirrels	0.91
Fats	0.25
Calories (kcal)	39
Minerals (mg/100 g):	
Potassium	190
Phosphorus	twenty
Magnesium	9
Calcium	6
Sodium	0
Iron	0.25
Zinc	0.17
Copper	0.068

Vitamins (mg/100 g):	
Vitamin C	6.6
Vitamin PP	0.806
Vitamin E	0.73
Vitamin B2	0.031
Vitamin B6	0.025
Vitamin B1	0.024

The fruits of peach trees contain flavonoids, carotenoids, sugars, the share of which in some varieties can reach 15-20%, organic acids (tartaric, malic, quinic, citric) essential oil, vitamins, salts of various minerals.

The most significant (among minerals) is the presence of potassium in peach fruits. 100 grams of fresh fruit contains about 15% of the daily human need for this mineral. And in 100 grams of dried peach - about 80-85%. There are also iron, magnesium, phosphorus, zinc in these fruits, but their presence in 100 g of fresh product is limited to 3-4% of the daily requirement. At the same time, the skin of the fruit surpasses the pulp in terms of the content of both mineral salts and flavonoids. ^[2]

Among the vitamins, the most important is the content of vitamin C and vitamin E in peach (up to 10% of the daily requirement per 100 g), but vitamins of group B are also well represented in fruits (B2, B6, B3 / PP, B1 - up to 4% w.p.).

The seeds of the stone contain fatty oils (up to 57%), essential oil, amygdalin, a number of acids (oleic, nonacosanoic, palmitic, etc.), potassium and iron salts.

Medicinal properties

The therapeutic effects associated with the use of peaches include the ability of fruits to enhance the secretion of digestive glands, normalize heart rhythm disturbances, exhibit diuretic and laxative properties. Judging by the regularly updated list of peach studies, extracts from various parts of the peach tree in the future may become a medicinal basis for the treatment of diseases and the correction of a number of pathological conditions:

- Problems of the gastrointestinal tract.

A number of studies show that peach preparations improve the functioning of the digestive tract. So, in an in vitro experiment ("in a test tube"), carried out on rat intestinal tissue, the activating effect of peach flower extracts on the motor activity of the digestive tract was confirmed. ^[3] The same extracts prevented anti-peristaltic contractions of smooth muscles.

- Cancer diseases.

Peach polyphenols can, under certain conditions, reduce the viability of breast cancer cells without affecting normal cells. ^[4] The kernel extract has also been shown to inhibit the growth of human colon cancer cells. And the bark of several species of peach trees can prevent the development of benign prostatic hyperplasia. ^[5]

- Cardiovascular pathologies.

Peach seed extracts inhibit the process of association and adhesion (aggregation) of platelets, thereby slowing down the formation of blood clots and blockage of blood vessels. ^[6] In addition, several types

of peaches have shown vasodilating effects. Moreover, extracts of peach tree branches also have a similar property that can effectively reduce high blood pressure. ^[7]

- Diabetes.

Although diabetes is on the list of contraindications when eating sweet peach fruits, other components of the plant may help diabetics control their glucose levels. Thus, it was experimentally found that peach tree leaves contain a substance that acts as a powerful inhibitor of glucose absorption in the small intestine of mice. Leaf extract, which helps reduce glucose absorption, may be useful in functional foods and drugs for hyperglycemia to prevent glucose absorption after meals. ^[eight]

Some works suggest that glycosides isolated from peach seeds in the form of a methyl extract can have anti-allergic and anti-inflammatory effects. ^[9]

In medicine

In modern scientific medicine, peach components are used as a raw material component of medical cosmetics, and are also used to create the oil base of some medicines. So, peach oil is prepared from seeds extracted from fruit pits, which is used in pharmaceuticals to dissolve water-insoluble substances, prepare injection solutions, and create the basis of liquid ointments (liniments).

Peach fruit extracts as a herbal dietary supplement are widely available on the market and are recommended by manufacturers to strengthen the heart and blood vessels, to normalize blood pressure, to increase hemoglobin levels and remove "excess" fluid.

Leaf extracts are positioned as general tonic preparations for the complex protection of the body. Manufacturers note that this peach remedy can increase physical endurance, improve digestion, normalize the functions of the endocrine glands and reduce the negative effects of stress.

In the list of indications for the use of extracts:

- cardiovascular diseases;
- intoxication;
- fatigue and sleep disturbances;
- digestive problems;
- respiratory diseases;
- gynecological pathologies: heavy menstruation and cycle disorders, fibrocystic mastopathy, hormone-dependent pathologies and benign tissue growths (endometriosis, uterine fibroids), etc .;
- anemia;
- thyroid pathology.

Such drugs, according to the instructions, are recommended to be taken for prevention once a day, 2-4 drops. During the treatment of the disease, the dose is usually increased by 5-7 times.

In folk medicine

In folk medicine, fruits, flowers, seeds, peach leaves cooked in different ways are used to treat:

- heart and blood vessels;
- hemorrhoids;
- urinary tract;

- digestive organs;
- diabetes;
- headaches and earaches;
- rheumatism;
- parasitic infection with helminths;
- skin diseases and pathologies (eczema, burns, purulent inflammation of the tissue, atopic dermatitis of an allergic nature).

Depending on the indications, specific recipes for multicomponent agents and concentrates are used. For example, to restore bowel function in case of constipation and disruption of the stomach with low acidity, it is recommended to drink freshly squeezed peach juice (50 g) 15 minutes before meals. Such an aperitif will enhance the secretory function of the digestive glands and help to cope with fatty foods. Also, fruit juice is used to treat urolithiasis.

No less widely used in folk medicine is the juice of peach tree leaves. It is believed that a few drops of it, instilled into the ear, help a person get rid of ear mites. In ancient folk medicine, there were ideas that in a similar way, with the help of peach leaves, you can save a person from intestinal helminths. To do this, it was necessary to grind the leaves into gruel, and put a bandage with it on the patient's navel. But, due to the lack of effectiveness of this method, oral intake of juice of leaves and / or inflorescences with sugar was more often practiced. It was believed that even 50 grams of juice could permanently remove the tapeworm. But even when applied externally, leaf juice was beneficial, relieving the skin of an untidy lime smell.

Often, peach nutritional supplements were recommended to tired and / or exhausted people simply to restore strength and create a general healing effect.

However? ancient healers perceived peach components not only as medicines. So, warts were removed with a fluff of skin mixed with cabbage juice, but the same remedy provoked a miscarriage in pregnant women. According to folk therapeutic traditions, eating only 0.5 grams of peach flowers could lead to a miscarriage.

Another component common in folk medicine is peach kernels. In Southwest Asia, eye diseases were treated with oil, decoctions and infusions of peach seeds, in Africa and later in America - fever, bronchitis, asthma, in Central Asia - migraine, urolithiasis and skin pathologies (when used externally). Examples of selected recipes for decoctions and infusions are given below.

Decoctions and infusions

- **Infusion of leaves from purulent-necrotic inflammation of the skin.** Peach leaves (8 pcs.) Are carefully crushed to a homogeneous mass and mixed with several slices of potato skins. The gruel is poured with boiling water (60-70 ml) and after a 15-minute infusion is transferred to a clean, tight bandage, which is applied to the affected areas of the skin. The duration of the procedure is from 30 minutes to an hour.
- **Decoction of leaves for herpes zoster.** Fresh leaves (100 g) are crushed and boiled in water (500 ml) for 10-15 minutes. After that, the composition should cool under the lid for 1-1.5 hours. To simplify the application of the composition to the body, a clean linen bandage is impregnated with the prepared liquid, changing it after drying.
- **Infusion / decoction of seeds and bark in chronic bronchitis.** Dry peach seeds (150 g) and crushed bark (150 g) are poured with apple cider vinegar (500 ml) and water (500 ml), after which they are closed and sent to a warm place for 5 days. During the infusion time, the mixture should be shaken or stirred regularly. After preparation, the infusion is put on a small

fire and evaporated until about half of the original volume remains. The preparation is completed by adding cognac or brandy (250 ml) to the composition.

The product is stored in a dark glass bottle or jar with a tight-fitting lid. With bronchitis, it should be taken 1 tbsp. l. every 4 hours. The same regimen is prescribed for fever and colds. But it is also recommended to use it to relieve ear pain (in the form of drops), and to remove worms (2 tablespoons three times a day).

in oriental medicine

The peach tree in China is one of the most revered plants: due to the fact that its flowers appear before the leaves, it is considered to have a stronger life energy than other trees. Since ancient times (and the domestication of the peach in China probably took place as early as 5000 BC), the peach has become an integral part of both general cultural and therapeutic traditions.

Medical practice involved the use of all parts of the plant (from the pulp of fruits, flowers and kernels of the stone to leaves, bark and roots) in the healing of the physical and metaphysical nature. For example, amulets were carved from a peach tree, which were supposed to expel diseases caused by evil spirits. But if the talismans did not help, healing decoctions were cooked from the peach components.

Peach fruits are also highly revered in Chinese culture, symbolizing long life and / or immortality. Even Shou-sin, known as the god of longevity, is depicted holding peach fruits in his hand. According to the ancient writings on Chinese medicine, those peach fruits that stayed on the branches all winter and were plucked only in early spring had special properties. A decoction of such fruits cast out 100 types of demons, removed 5 types of toxins and was used in the treatment of "foulness" (this definition meant sudden pallor, loss of consciousness, bleeding from the limbs, dizziness due to the action of a toxin or pathogenic Qi).

All parts of the peach tree in Chinese medicine have general and specific functions and indications for use. For example, the common function of peach fruits, seeds and flowers is to eliminate stagnation and improve blood circulation, as well as the normalization of menstruation associated with this. Due to their anticongestive effects, these peach ingredients are used for prolonged absence of menstruation (with amenorrhea) and for cycle disorders accompanied by a painful syndrome (with dysmenorrhea), when these conditions are provoked by stagnation of blood and Qi energy.

Also, fruits, seeds and flowers are used to restore digestion with dry intestines and get rid of constipation. There are the following traditional recipes for the use of various ingredients for the problems listed:

- **Fruit based.** Three fruits are peeled and pitted, and the remaining pulp is mixed with honey (30 g) and steamed until tender.
- **Seed based.** Peach seeds (10 g), apricot seeds (10 g), black sesame seeds (15 g) are mixed, poured with 250 ml of water and boiled for 15-30 minutes. Taken twice a day until cured.
- **Flower based.** Freshly picked peach flowers (50 g) are thoroughly mixed with fresh honey (500 ml), placed in a vessel and evenly sprinkled with sugar (2 tablespoons) on top. After that, the vessel is tightly closed and left for 10 days in a dark, cool place. This remedy for constipation is taken twice a day, 1 tbsp. l. diluted with boiled water. The same composition is recommended for difficult urination and edema.

If the seeds and flowers of the peach correspond to the channels of the large intestine, liver and heart, then the leaves of the plant are responsible for the spleen and kidneys. With their help, they remove

toxins and parasites, relieve inflammation and itching, and cool the heat. Therefore, drugs based on them are used externally for lichen, eczema, burns, skin inflammation, pediculosis, vaginal trichomoniasis (by wetting the decoction of the external genital organs). Also, leafy decoctions are prescribed for pain in the joints and with limitation of their mobility. Inside, decoctions (3-6 g per dose) are drunk for migraines.

Decoctions based on branches and a white layer of tree bark can eliminate the action of the toxin and remove parasites. In addition, with the help of decoctions of shoots, they also improve blood circulation, eliminate pain in the epigastrium and treat lichen, and with the help of the bark, they relieve toothache and eliminate swelling. To do this, either prepare a powder or make a mixture, which is then rinsed in the mouth.

In traditional Chinese medicine, even the villi of the fruit peel are used as an independent healing ingredient. They treated all kinds of pain, primary infertility, uterine bleeding, congestive blood seals in the abdomen and those diseases that were caused by werewolves and evil demons.

It is characteristic that among the contraindications to the use of almost all drugs was pregnancy. It was also not recommended to eat unripe fruits and abuse ripe ones in order to avoid bloating. Especially undesirable peach overeating was considered with excessive internal heat.

Although Chinese physicians have been developing a complex system of treatment with peach ingredients for thousands of years, some distinct therapeutic traditions can be identified in Tibetan and Indian traditional medicine. So, in Tibet, peach oil was used to treat conjunctivitis, and leaf decoctions were used to eliminate fever and colds. In India, the leaves of the plant were used to treat dysentery.

In scientific research

The study of peach (and preparations from various parts of the plant) is not always aimed at discovering direct medical effects, on the basis of which it is possible to immediately recommend the creation of a therapeutic program. The result of the work of many projects is simply a statement of the presence or absence of a certain local effect, which in itself does not yet directly determine the therapeutic effect. In addition, a number of studies are devoted to the purely "economic" topic of growing and storing perishable peaches, as well as ways to transport them as painlessly as possible. Here we do not present such works, but limit ourselves to examples of scientific experiments that better than others illustrate the potential use of peaches in improving human health.

Peach polyphenols inhibit tumor growth and metastasis of breast cancer cells. ^[ten]

MDA-MB-435 breast tumor growth inhibition and antimetastatic effects of peach polyphenols were studied in vivo in rat experiments. The results showed that tumor growth and metastasis to the lungs of animals was inhibited by peach polyphenol preparations in the dose range of 0.8-1.6 mg/day.

The scientists suggest that one of the molecular targets for the antimetastatic activity of peach polyphenols is the modulation of metalloproteinase gene expression. From this it is concluded that peach polyphenolic compounds may represent a new chemoprophylactic agent to reduce the risk of metastasis in combination therapy in the diagnosis of primary cancer. An attempt to recalculate the required dose of essential polyphenols for human clinical studies yielded ~370.6mg/day for a 60kg adult. It is believed that this is equivalent to a person eating 2-3 fresh peach fruits per day. In the absence of fresh fruit, a dietary supplement of fruit polyphenol extract powder can be used to continue research.

Peach kernel extracts have an antiproliferative effect on human colon cancer cells in experiments on cellular material.^[eleven]

Peach kernel extract, under certain conditions, is able to inhibit the growth of human colon cancer cells due to the content of amygdalin. If this cyanogenic glucoside enters the body with food, dangerous intoxication can develop. However, with the direct effect of amygdalin extracts on cancer cells, an antiproliferative effect was observed in certain dosages.

Monitoring of changes in the kinetics of the cell cycle in colon cancer cells was carried out over different periods (in 24, 48 and 72-hour intervals). As a result, a complex pattern of reactions was observed, in which, depending on the concentration and period, either a proliferative or antiproliferative effect occurred. However, scientists, based on the studied algorithms, nevertheless consider it possible to create anti-cancer therapy using extracts of peach kernels.

Peach oil stops tissue necrosis (in vitro experiments) and reduces atherosclerosis in mice (in vivo experiments).^[12]

For in vitro experiments, human umbilical vein tissue affected by TNF- α tumor was taken. Under these conditions, peach oil showed the ability to suppress the thrombosis provoking factor at different levels and improved the viability of healthy endothelial tissue cells.

In experiments on mice, peach oil helped:

- reduce the level of total cholesterol;
- triglycerides;
- cholesterol in low density lipoproteins;
- increase serum high-density lipoprotein cholesterol levels;
- reduce the area of atherosclerotic lesions in the aorta;
- significantly reduce the expression of TF protein to suppress the formation of atherosclerotic plaque.

Based on this, scientists conclude that peach oil may be useful in preventing atherosclerosis in the presence of cardiovascular disease.

Weight regulation

In East Asia, peach blossom tea is popular as a weight loss remedy. True, until recently it was drunk, following mainly the ancient traditions of folk medicine. However, recently the ability of brewed peach blossoms to fight obesity was tested in in vitro and in vivo scientific experiments on mice.^[13]

Phytochemicals in water extracts of peach flowers (0.2% and 0.6%) were tested for 8 weeks in mice divided into groups with different diets, including a high fat diet. The results of this study showed that peach blossom extracts:

- significantly reduced body weight;
- reduced the mass of fat in the abdominal cavity;
- lowered serum glucose levels;
- reduced the weight of the liver and spleen compared with the control group.

In general, data analysis demonstrated the ability of extracts to suppress the expression of lipogenic genes, improve lipid metabolism in the liver (by reducing lipogenesis and increasing fatty acid

oxidation). This made it possible to conclude that traditional slimming tea is indeed able to get rid of excess weight, at least in obese mice.

Peach fruits with their calorie content of about 40 kcal / 100g of product are also quite popular in various comprehensive weight loss programs, but there they often play the role of an auxiliary product that removes “excess” water, speeds up metabolism, and helps digest “heavy” food.

In cooking

In food, peach fruits are consumed mainly in fresh and canned form, as well as as a filling for baking. For cooking, as a rule, table varieties are used, characterized by fibrous pulp. Fruits with cartilaginous pulp are more often used for canning (including jams, preserves, compotes).

Sweet pies with fruit filling are very diverse - from Charlotte and cottage cheese peach desserts to fruit pizza and multi-component cobblers. But they are also very popular. So, in 2015, during the 65th Peach Festival in Louisiana, USA, the organizers baked a fruit cobbler with a total weight of 1021 kg, which required 372 kg of peaches.

However, peaches are also added to savory dishes, creating a special contrast with their taste. For example, here is a recipe for cooking chicken fillet with cheese and canned peaches:

1. Chicken fillet (600 g) is washed, dried, cut into medium-sized pieces, salted, peppered and laid out in a baking dish greased with vegetable oil (1 tablespoon). Optionally, you can add bay leaf (2 pcs.)
2. Canned peaches (400 g) are removed from the syrup and laid out on top of the chicken, also in small slices.
3. Hard cheese (100 g) is rubbed and mixed with a garlic clove pressed through a press and sour cream (150 g). The resulting sauce is evenly spread over the peaches.
4. 4 The dish is baked in the oven for about 45 minutes at 180°C.

The taste of peach is also very popular with consumers and, accordingly, manufacturers of alcoholic beverages. Moreover, the peach component in liqueurs and wines manifests itself so clearly that even in the presence of other components (apricots, oranges, plums, etc.), peach is often mentioned in the product name. Among the most common dessert liqueurs are Dutch Peach Tree (De Kuyper), French Creme de Peche de Vigne de Bourgogne (Joseph Cartron), Italian Volare Peach (Rossi D'Asiago Distillery), Czech Peach (Fruko Schulz). Although in each of these countries dozens of other popular brands produce peach liqueurs.

In cosmetology

In professional cosmetology, the moisturizing and anti-inflammatory properties of peach extracts containing phytosterols, fatty and essential oils, carotenoids, trace elements and vitamins are used. Such extracts are oily extracts of fruit fruits. They are recommended by manufacturers to eliminate dry skin, relieve redness and swelling, and mild lightening. They are often added to anti-aging masks, creams, lotions. Including when creating cosmetics at home, when fresh fruits are not available or when a more pronounced effect from a concentrated composition is needed.

Peach components are used to care for almost the entire body (face, hands, hair, etc.). Peach phytocomponents are introduced into shampoo recipes to eliminate dry skin, nourish and strengthen hair.

In medical cosmetics, the wound healing properties of the fruit are also used. Peach oil treats eczema, psoriasis, dermatitis, burns.

Dangerous properties of peach and contraindications

A person often has allergic reactions of varying severity to peach fruits. Since the skin of the fruit is especially allergenic, small pieces of peach begin to be added to the diet in small pieces for small children 6-7 months of age. It is also advisable for a nursing woman not to abuse fruits, limiting herself to 1 peach in 2-3 days. Restrictions apply to the period of pregnancy. Caution should be used peach and people with diabetes.

Peach kernels, which are often used in Asian cuisines and in traditional medicine recipes, contain the substance amygdalin, which belongs to cyanogenic glycosides. During hydrolysis, the molecule of this substance decomposes into a "poisonous" molecule of hydrocyanic acid and a molecule of benzaldehyde, which is responsible for the almond smell of the nucleoli. With a high concentration of amygdalin, a person may experience poisoning of varying severity.

The magnitude of the danger is individual, as it depends on a number of related factors. For example, because glucose is able to bind cyanide, people who eat peach kernels in sweet foods are less likely to be poisoned. In addition, for the implementation of hydrolysis, an acidic environment or the presence of emulsin, an enzyme contained in the peach seed, is required. However, when heated, the emulsion is destroyed, and, therefore, the algorithm for the formation of poisonous hydrocyanic acid is violated (it is not for nothing that in classic culinary recipes, kernels are often pre-fried). Therefore, the main danger of an overdose of amygdalin from peach seeds is associated with uncontrolled self-medication (for example, prescribing high doses of peach seed extracts).

Selection and storage

To choose the most ripe and fresh peaches, you need:

- lightly press on the pulp - ripe, but not overripe fruits will be slightly elastic and springy;
- smell the fruit - the best fruits spread a strong characteristic aroma;
- look at the cut - depending on the variety, the flesh can be yellow, and white, and pink, and red, but varieties with a pink and white center are considered sweeter (although this parameter, along with varietal affiliation, is strongly influenced by the region of origin and ripening conditions).

Indirectly, insects can help in choosing peaches. Experts say that wasps and bees "understand" fruits better than people, so they flock to more ripe fruits more actively. But if the purchased peaches still turn out to be unripe, they can simply be allowed to "lay down" for several days at room temperature. If the ripening process needs to be accelerated, the peaches should be placed in the same paper bag as the ethylene-releasing bananas, apples, or apricots. Although peaches themselves abundantly emit this gas, which activates the ripening processes.

Another indirect guide for choosing the most delicious peach can be the shape of the fruit. It is believed that slightly asymmetrical peaches have a brighter and more pronounced taste.

Ripe fruits do not tolerate transportation well, so fruits are usually removed at the stage of technical maturity and treated with gaseous sulfur-containing preservatives so that the peaches do not overripe on the way. However, if the chemical protection was carried out too intensively, the peaches react to it. In over-pickled and stale fruits, the stone will be dried and wrinkled. Although such fruits can not be thrown away, but pies and compotes can be made from them.

It is impossible to store ripe peaches for a long time without changing the temperature regime. Therefore, in order to slightly extend this period, the fruits are sent in a paper bag to the refrigerator, on a shelf with a temperature of about 0 ° C. To significantly increase the shelf life, it is better to freeze the fruit.

You can freeze both whole fruits with a stone, and individual halves. In the first case, clean and dry peaches are simply wrapped in paper (each fruit separately), put in a common closed bag, which is sent to the freezer. In the second case, after removing the pit, the halves of the peach are placed in the first layer on the bottom of the container, cut up. Then they are covered with parchment, after which the next layer is placed on this paper cut down. Before placing in the freezer, the container is tightly closed with a lid.

For the winter, not only fruits are harvested, but also peach leaves. To preserve the maximum of useful properties, they are first kept over boiling water for about 10 minutes before freezing (without immersion in boiling water), then before cooling - over cold water (also without immersion). And the already cooled leaves are then dried on paper towels and sent to the freezer in an airtight container.

Varieties and cultivation

Peaches are called not only the fruits of real peaches, but also fruits belonging to its subclasses. Most often, four varieties are distinguished, differing in two class characteristics: the hairiness of the skin and the fusion of the stone with the pulp.

Real peaches - the skin is velvety, the stone is separated easily. The first class also includes fruits of non-traditional shape - onion peaches, or flattened ones.

- Nectarines - the skin is smooth, the stone is separated easily.
- Pavia (Pavies) - the skin is velvety, the bone is separated poorly.
- Brugnons (Brugnons) - the skin is smooth, the bone does not separate well.

A sear, or shaptola (with an emphasis on the last syllable) is called dried peach fruit. The color of the pulp of the fruit depends on the varieties (their breeders have bred many), and can be red, white, yellow, orange.

In the jungles of South America, the "peach palm" grows, which also produces yellow-orange cup-shaped or oval fruits with an ovoid pointed stone. However, this plant belongs to the Palm family (as opposed to peaches, which belong to the Rose family) and is similar to *Prunus persica* only in name.

The variety of peach classes, among other things, helps to popularize the fruit even more. (For example, those consumers who do not like superficial hairiness or a stone stuck in the pulp can easily switch to nectarines). And an increase in the popularity of any product usually leads to a more attentive attitude towards it from the scientific community. So, it is quite possible that in the near future we will learn about some more amazing healing properties of peach.

Literature

1. US National Nutrient Database, [source](#)
2. Manzoor M., Anwar F., Mahmood Z., Rashid U., Ashraf M. Variation in Minerals, Phenolics and Antioxidant Activity of Peel and Pulp of Different Varieties of Peach (*Prunus persica* L.) Fruit from Pakistan – *Molecules* 2012 May 30 , 17(6), 6491-6506. doi: 10.3390/molecules17066491.

3. Han W., Xu JD, Wei FX, Zheng YD, Ma JZ, Xu XD, Wei ZG, Wang W., Zhang YC Prokinetic activity of *Prunus persica* (L.) Batsch flowers extract and its possible mechanism of action in rats - Biomed . Res. Int. 2015, 2015, 569853. doi: 10.1155/2015/569853.
4. Marcia Vizzotto, Weston Porter, David Byrne, Luis Cisneros-Zevallos. Polyphenols of selected peach and plum genotypes reduce cell viability and inhibit proliferation of breast cancer cells while not affecting normal cells. food chem. 2014 Dec 1;164: 363-70. doi: 10.1016/j.foodchem.2014.05.060.
5. Jena AK, Vasisht K., Sharma N., Kaur R., Dhingra MS, Karan M. Amelioration of testosterone induced benign prostatic hyperplasia by *Prunus* species - J. Ethnopharmacol. 2016, Aug 22, 190, 33-45. doi: 10.1016/j.jep.2016.05.052.
6. Yang NY, Liu L., Tao WW, Duan JA, Liu XH, Huang SP Antithrombotic lipids from Semen *Persicae* - Nat. Prod. Res. 2011 Oct. 25(17), 1650-1656. doi: 10.1080/14786419.2011.568942.
7. Bumjung Kim, Kwang-Woo Kim, Somin Lee, Cheolmin Jo, Kyungjin Lee, Inhye Ham, Ho-Young. Choi Endothelium-dependent vasorelaxant effect of *prunus persica* branch on isolated rat thoracic aorta. Nutrients. 2019 Aug 6;11(8):1816. doi: 10.3390/nu11081816.
8. Shirosaki M., Goto Y., Hirooka S., Masuda H., Koyama T., Yazawa K. Peach leaf contains multiflorin A as a potent inhibitor of glucose absorption in the small intestine in mice - Biol. Pharm. Bull. 2012, 35(8), 1264-1268. doi: 10.1248/bpb.12-00058.
9. Kim GJ, Choi HG, Kim JH, Kim SH, Kim JA, Lee SH Antiallergic inflammatory effects of cyanogenic and phenolic glycosides from the seed of *Prunus persica* - Nat. Prod. commun. 2013, Dec., 8(12), 1739-1740.
10. Noratto G., Porter W., Byrne D., Cisneros-Zevallos L. Polyphenolics from peach (*Prunus persica* var. Rich Lady) inhibit tumor growth and metastasis of MDA-MB-435 breast cancer cells in vivo - J. Nutr. Biochem. 2014, Jul., 25(7), 796-800. doi: 10.1016/j.jnutbio.2014.03.001.
11. Cassiem W, de Kock M. The anti-proliferative effect of apricot and peach kernel extracts on human colon cancer cells in vitro. BMC Complement Altern Med. 2019 Jan 29;19(1):32. doi: 10.1186/s12906-019-2437-4.
12. Hao E, Pang G, Du Z, Lai YH, Chen JR, Xie J, Zhou K, Hou X, Hsiao CD, Deng J. Peach Kernel Oil Downregulates Expression of Tissue Factor and Reduces Atherosclerosis in ApoE knockout Mice. Int J Mol Sci. 2019 Jan 18;20(2):405. doi: 10.3390/ijms20020405.
13. Jungbin Song, Young-Sik Kim, Linae Kim, Hyo Jin Park, Donghun Lee, Hocheol Kim. Anti-Obesity Effects of the Flower of *Prunus persica* in High-Fat Diet-Induced Obese Mice. Nutrients. 2019 Sep 11;11(9):2176. doi: 10.3390/nu11092176.
14. Yunfei Zheng, Gary W. Crawford, Xugao Chen. Archaeological Evidence for Peach (*Prunus persica*) Cultivation and Domestication in China. PLOS ONE. September 5, 2014. doi.org/10.1371/journal.pone.0106595.
15. Heaviest peach, [source](#)

[An extended HTML version of this article](#) is available on the edaplust.info website.

Peach - 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

Received 07/15/20

Abstract. The article discusses the main properties of peach 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 peach in various types of medicine and the effectiveness of its use in various diseases are considered. The potentially

adverse effects of peach on the human body under certain medical conditions and diseases are analyzed separately. Considered scientific basics diets With his application.



Blueberry (lat . *Vaccinium uliginosum*)

Eliseeva Tatyana, chief editor project EdaPlus.info

Alena Tarantul, nutritionist

Email: eliseeva.t@edaplust.info, tarantul.a@edaplust.info

Abstract. The article discusses the main properties of blueberries 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 blueberries in various types of medicine and the effectiveness of its use in various diseases are considered. The potentially adverse effects of blueberries on the human body under certain medical conditions and diseases are analyzed separately. The scientific foundations of diets with its application are considered.

Keywords: blueberries, benefits, harm, beneficial properties, contraindications

Beneficial features

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

Main substances (g / 100 g):	Fresh blueberries [1]
Water	84.21
Carbohydrates	14.49
Sugar	9.96
Alimentary fiber	2.4
Squirrels	0.74
Fats	0.33
Calories (kcal)	57
Minerals (mg/100 g):	
Potassium	77
Phosphorus	12
Magnesium	6
Calcium	6
Sodium	one

Iron	0.28
Zinc	0.16
Copper	0.057
Vitamins (mg/100 g):	
Vitamin C	9.7
Vitamin E	0.57
Vitamin PP	0.418
Vitamin B6	0.052
Vitamin B2	0.041
Vitamin B1	0.037

The composition of blueberries is characterized by a high content of vitamins C, K, E (about 30%, 16% and 14% of the daily intake, respectively). According to the content of minerals, blueberries are not among the champions, but fruits contain iron, zinc, magnesium, potassium, phosphorus, etc. in moderation.

The composition of the berries also includes pectin (up to 0.6%), organic acids (up to 2.7%), fiber (1.5-2%), sugars (8-10% by the time of collection). Moreover, in the cultivated northern tall blueberries, there are about two times more sugars than in the wild. And this figure can still be significantly increased if the fruits are "held" on the bush for 4-6 days after staining.

In 100 grams of fresh blueberries, up to 3500 mg of anthocyanins and leucoanthocyanins, up to 200 mg of flavonols, about 270 mg of catechins, 300-340 mg of triterpene and 150-300 mg of chlorogenic acids were found.

The amount of a number of substances that cause the healing effects of blueberries varies greatly depending on the species (varietal) and cultivation methods. For example, the cultivated tall blueberry had, on average, almost two times less organic acids than the swamp berry. When comparing the content of chlorogenic acid, flavonol, anthocyanin in the varieties O'Neal, Bluecrop, Bluejay, Brigitta, significantly higher levels of anthocyanidins were recorded than in other varieties. But in organically grown blueberries, there was very little anthocyanidin, but there was a lot of flavonol and chlorogenic acid. ^[2]

Also, in determining the phenolic, flavonoid, anthocyanin and antioxidant enzymatic activity of the pulp and skin of berries, the stage of fruit development is essential. When comparing data on 5 stages of the development of tall blueberries (from the "green" stage to the "blue"), it was found that most of the polyphenol oxidase (an enzyme of the oxidative system) was contained in green berries, catalase (an enzyme-catalyst for the decomposition of hydrogen peroxide) - in red, superoxide dismutase (another antioxidant enzyme) in blue. Although, in general, the more ripe the blueberry was, the higher the activity of antioxidant enzymes it showed. ^[3]

Medicinal properties

If we consider blueberries as a set of valuable biologically active substances, then we can predict various pharmacological effects associated with eating it:

- Phytoestrogens (plant hormones) of blueberries protect against heart and vascular diseases (reduce "bad" cholesterol, delay the development of atherosclerosis).
- Caffeic and chlorogenic acids have a capillary-strengthening, urinary and choleretic effect.
- Folic and ellagic acids prevent the appearance of neoplasms.
- Bioflavonoids contribute to the normalization of the activity of the thyroid gland and some other endocrine glands.

- Betaine from blueberries exhibits anti-ulcer properties. In addition, betaine is known as an appetite stimulant and as an atherosclerotic and lipotropic substance that can remove fats and toxic decay products from the liver.
- Pectins prevent damage to body tissues by heavy metals and radioactive elements.
- Vegetable fibers improve the functioning of the digestive tract.

Despite the great potential of the berry, not much is known today about the medicinal properties of blueberries, reliably confirmed by peer-reviewed scientific studies, although work on its study is being carried out by specialists from all over the world.

There is evidence that due to the use of the fruit extract of some species of this plant, insulin resistance is “corrected”. A recently published study of blueberry supplementation in mice reported an improvement in glucose tolerance. Potentially, these properties of blueberries could be used, for example, in the treatment of diabetes in humans, but most of the effects are still recorded in laboratory experiments. True, the media reported that the Center for Human Nutrition Research in Beltsville (Maryland) at the US Department of Agriculture, as part of a clinical study, tested the effect of blueberry powder on insulin sensitivity in patients. However, the results have not yet been reported.

However, some of the medicinal properties of blueberries are already being confirmed in human studies. For example, many have known from childhood “from the elders” that blueberries have a beneficial effect on visual function. And although folk ideas often mythologize the product, attributing unconfirmed properties to it, this time the scientific data, in general, confirm the current image.

So, Chinese scientists have found that the tablet intake of blueberry extracts can reduce visual discomfort and relieve eye fatigue that occurs while working on a computer. Also, the study of the effect of blueberries on human visual function was carried out in the USA, New Zealand, Italy, Spain, France and other countries.

In Japan, for example, scientists divided 26 people into 2 groups, one of which was given 125 mg of blueberry extract daily for 28 days. During the entire experiment, with the help of frequent flashes of light, the rate of onset of eye fatigue and the degree of visual impairment were verified in the subjects. It turned out that the representatives of the group that received the berry supplement got tired more slowly, and the deterioration in their vision was less pronounced. The same results were obtained by Japanese scientists when they swapped the representatives of the groups and duplicated the experiment again. Not surprisingly, it has now become a popular practice among the Japanese to protect their eyes from monitor radiation by prophylactic use of blueberry juice or vitamin products containing blueberry concentrate.

Other scientists (albeit again only in laboratory experiments) have found that blueberry polyphenol-enriched fractions reduce retinal damage caused by blue light in cell culture and mice experiments. According to scientists, such polyphenolic fractions in the future can serve as a therapeutic agent in the fight against age-related macular degeneration. ^[four]

Also in the future, blueberries may be able to help in the treatment of cancer. Chinese scientists have found that blueberry extract reduces viability, and also affects the cyclic progression and membrane permeability of grown Hep-G2 (human hepatocellular carcinoma cell line), Caco-2 (human colorectal adenocarcinoma cell line) and 3T3-L1 (non-malignant mouse cells).).

Another group of researchers independently concluded that anthocyanins extracted from blueberries could be a promising therapeutic tool for suppressing human colorectal cancer (anti-inflammatory activity has been documented in experiments on human colon and rectal cancer cells) ^[5]. Also, already

in animal experiments, blueberries inhibited the development of esophageal cancer, estrogen-induced breast cancer and prevented DNA damage.

While evidence for blueberry's cancer-fighting benefits remains limited, the American Institute for Cancer Research has included the blueberry on its list of cancer-fighting foods.

Highbush blueberry extracts can potentially have a preventive and therapeutic effect against ulcerative colitis by regulating oxidative processes and suppressing the expression of inflammatory mediators (these effects were found in experiments on mice).^[6]

There is evidence that **blueberries are good for the cardiovascular system**. So, in one study, taking a dried blueberry mixture for six months, equivalent to 150 grams of a berry per day, provided a 12-15 percent reduction in the risk of cardiovascular pathologies in people with metabolic syndrome, improved endothelial function (a layer of cells on the inner surface of blood vessels) and reduced arterial stiffness^[7]. In another 8-week clinical study, 48 postmenopausal women in the early stages of hypertension were given a powdered blueberry extract equivalent to a cup of berries a day. As a result, in patients, the upper pressure decreased by an average of 5.1%, and the lower one by 6.3% (compared to the placebo group).

Blueberries also improve brain function. Because blueberry anthocyanins are able to cross the blood-brain barrier, they can reduce vulnerability to oxidative stress that occurs with aging, reduce inflammation, and increase signaling between neurons. According to Barbara Shukitt-Hale of the Tufts HNRCA Neurology and Aging Laboratory, “A growing body of preclinical and clinical research has identified neurological benefits associated with berry consumption; In addition to their now well-known antioxidant effects, berry supplements also have a direct effect on the brain.”

In one large study, conducted on 16,000 women over 70, they were asked to eat half a cup of blueberries or strawberries 1-2 times a week. According to scientists, this slowed down the rate of brain aging by about 1.5-2 years.

In an animal experiment, scientists found that adding blueberries to the diet improved short-term memory, navigational skills, balance, and coordination. It is assumed that the active substances contained in blueberries are likely to “force” aging neurons to communicate effectively again.^[eight]

Medicinal properties are possessed not only by berries, but also by other parts of the plant. For example, flavonoids of tall blueberry leaves exhibit a pronounced immunomodulatory effect. Ethanol extracts significantly reduce the levels of tumor necrosis factor in the cellular material, normalize (by reducing expression) the regulation of the factor that controls the cell cycle, apoptosis, and the expression of immune response genes. That is, flavonoids derived from the leaves of the plant are likely to prevent inflammation, cancer and autoimmune diseases.^[9]

Use in medicine

In pharmacy chains, blueberry preparations registered as medicines are not sold, but there you can find dietary supplements from various manufacturers, which contain blueberry extract. As a rule, these extracts are included in a group of drugs that improve the state of the cardiovascular system. But this industry is not without scandals and revelations.

In 2016, a warning^[10] was published in the media about the functioning of a fraudulent scheme for the sale of blueberry extract for the treatment of diabetes. For credibility, the authors of the scheme created a fake website of the Ministry of Health, on the pages of which a dietary supplement called Golubitoks was advertised. (The practice of creating such shim sites is generally widespread in online commerce).

The very fact of the unfair sale of dietary supplements does not mean that the drug is fake or ineffective. But such a dubious distribution scheme, with wide publicity, could well undermine consumer confidence in the product. However, this did not happen. The drug "Golubitoks" and today is issued in the top for the request "blueberry extract" by all popular search engines.

"Golubitoks" is sold in the form of drops of a concentrate of fruits, shoots and leaves of blueberries and, according to the instructions, is intended for a comprehensive restoration of the body. Among the medicinal properties of the drug, first of all, those that were found in real medical and scientific studies are listed: normalization of visual function, improvement of the brain, gastrointestinal tract, heart, regulation of blood pressure, restoration of blood vessels and prevention of atherosclerotic damage.

In addition, among the therapeutic effects, normalization of sleep, improvement in the condition of the skin, nails and hair, elimination of bacterial and fungal infections, prevention of sexual dysfunction, infertility, osteoporosis, etc. are indicated. But, since the full composition of the drug includes many other herbal components, perhaps some of the effects should be attributed to them.

In folk medicine

In folk medicine, blueberries are also used as a remedy for treating diabetes and cardiovascular diseases, lowering high blood pressure, and restoring visual function. With beriberi, blueberry juice is drunk as a tonic and antiscorbutic agent. A tea drink based on fruits and leaves is brewed to reduce high temperature, inhibit inflammation, and remove radioactive nuclides.

The berries of the bush are also used as a mild laxative, diuretic and choleretic agent for inflammation of the renal pelvis, mucous membrane of the large intestine, stomach and small intestine, for dysentery and gastritis.

Decoctions and infusions

The general rules for the preparation of blueberry infusions involve the use of 20 grams of fresh or dried fruits per cup of boiling water (250 ml), which are aged in hot water for an hour. With bronchitis and temperature, this infusion is taken with a teaspoon of honey twice a day, 80 ml each, with hypertension - three times a day, 50 ml each, with colitis - 2 tbsp. l. every 3 hours.

To prepare decoctions from leaves and shoots of a shrub, you will need 50 grams of crushed raw materials per glass of water (250 ml), which should be boiled for 30 minutes. Drink a decoction after straining for heart disease, high blood pressure, diabetes, inflammation of the excretory organs, kidney disease, anemia, constipation. Different folk healers can find dosage options, but the most common scheme for taking decoctions of the plant part of the shrub is 1 tbsp. l. 3 times a day. For heart problems, 3-6 doses per day are often recommended.

In scientific research

Evidence-based medicine cannot blindly rely on the experience of traditional medicine, so scientists in their experiments test the long-known and new medicinal properties of blueberries. Examples of such studies are given below:

Blueberry extract has a beneficial effect on eye fatigue and visual discomfort caused by a computer screen. ^[eleven]

60 volunteers were divided into two groups: for 4 weeks, participants from the first were given 1000 mg/day of blueberry extract tablets, participants from the second received a placebo. The results of the

experiment were evaluated by a questionnaire followed by scoring from 0 to 60. During the month, the subjects assessed the degree of eye irritation, tension, dryness, tearing, fogging, etc. whenever they sat down at the computer. At the end of the experiment, scoring showed that visual discomfort in the first group was significantly lower than before the start of the experiment. There were no differences in the assessment of the state of the participants in the second group.

Blueberry extract reduces the viability of cell lines of human hepatocellular carcinoma (Hep-G2), human colorectal adenocarcinoma (Caco-2) and non-malignant mouse cells (3T3-L1), and also affects the cyclic progression and membrane permeability of grown cells. ^[12]

According to scientists, blueberry extract contains 3 types of anthocyanins (cyanidin-3-glycoside, malvidin-3-glycoside, malvidin-3-galactoside). It is with their influence that the release of LDH, a marker of cell membrane permeability, is associated. LDH levels were measured 24, 48 and 72 hours after blueberry extract application. It turned out that the membrane permeability of Caco-2 cells increased by 21% after 48 hours and by 58% after 72 hours compared with measurements after the first day. The results were even better with Hep-G2 cell culture: 66% and 139%, respectively. As for 3T3-L1 cells, the activity of the LDH marker in them, unexpectedly for scientists, decreased by 21% 72 hours after using the blueberry extract.

The use of the extract also affects the cell cycle. Violations in one of the phases of this cycle leads to an increase in the level of cell death in all three cultures.

Systematic consumption of blueberry extract exhibits hypoglycemic, hypolipidemic, antidepressant-like, and antioxidant effects in an animal model of the metabolic syndrome. ^[13]

In this study, the researchers examined the effects of blueberry fruit extract on metabolic, behavioral, and oxidative stress parameters in the hippocampus and cerebral cortex of mice fed a high-calorie diet. The animals were divided into 4 groups: mice in the first two groups were fed standard food with and without blueberry extract for 150 days, while in the third and fourth groups they were fed high-calorie food with neutral saline and extract additives.

Animals of group No. 3 ("high-calorie food + saline") by the end of the experiment were characterized by increased body weight, an increase in visceral fat, elevated levels of triglycerides, glucose, cholesterol, and had insulin resistance. The addition of blueberry extract in group #4 prevented an increase in these metabolic parameters. In addition, the extract showed the ability to reduce the levels of substances that react with thiobarbituric acid in the cerebral cortex and hippocampus of animals. Differences were manifested in the mobility of animals - mice in group No. 4 were more active than animals in group No. 3.

Weight regulation

The above study showed that blueberry extracts (at least blueberry rod) can neutralize the accumulation of visceral fat and prevent weight gain in animals on a high-calorie diet.

There is no direct evidence that extracts (or, even more so, berries in the diet) will affect humans in a similar way. But in 2019, British researchers conducted an experiment in which they introduced blueberry supplements into the diet of people with metabolic syndrome for 6 months, in which there is an increase in adipose tissue in the waist, as well as a violation of fat and carbohydrate metabolism in the body. And indirectly, the results of these studies confirm the effect of blueberries on the metabolism of overweight people.

115 people with metabolic syndrome aged 55-70 years and a body mass index greater than 30 kg / m² received in three groups either 75 grams of blueberries per day, or 150 grams, or a placebo (more precisely, they were given a dried powder equivalent to the indicated dosage). According to the results of the experiment, scientists came to the conclusion that, unlike placebo and even a 75-gram dose of blueberries, a 150-gram supplement per day was able to reduce some metabolic indicators by up to 15%.

It may be a little embarrassing that the study was supported by an organization that monitors the spread of blueberries in the United States (US Highbush Blueberry Council). Nevertheless, firstly, the authors of the study deny any third-party interference in their work, and secondly, such experiments still encourage those who want to lose weight, especially when it is difficult for a person to overcome his eating habits and tendency to overeat.

In cooking

Blueberries are eaten fresh and dried without additional processing, and damaged berries are processed into jams, jams, juices, sauces, fruit drinks, berry wines, and kvass. In culinary recipes, blueberries are included in baking. In some regions of the United States and Canada, muffins and cakes with this berry have become a local specialty.

Chinese blueberries can be used as an effective natural preservative that can inhibit the activity of Salmonella, Staphylococcus aureus, Listeria monocytogenic and some other pathogenic bacteria. It is assumed that the components of the raw blueberry extract have a destructive effect on the membrane cell wall of bacteria. At least in this way, E. coli strain O157:H7 destroys the extract of undersized wild blueberries.

In cosmetology

In cosmetics, blueberries are used in the form of berry extracts to protect the skin from UV damage, reduce redness and signs of aging, as well as nourish the skin and provide antioxidant support. The optimal concentration of blueberry extract in anti-aging products is approximately 2-3%. The ground powder of the plant's seeds is sometimes used as an exfoliating agent in scrubs.

In home cosmetics, blueberries are rarely used, since the cost of such procedures is considered unreasonably high. But the leaves of a wild shrub in decoctions and infusions are still in demand to create a tonic effect when taking a bath.

Dangerous properties of blueberries and contraindications

Blueberries are considered a low-allergenic product. However, lactating women are advised to carefully introduce it into the diet so as not to provoke allergies in children. This berry is also not recommended for violations of the normal outflow of bile (for example, with biliary dyskinesia), when taking blood-thinning medications (so as not to interfere with their action), and when diagnosing thrombosis. The high content of vitamin K in blueberries, which contributes to increased blood clotting, can exacerbate the situation.

If, when using wild blueberries “from the bush”, an individual change of consciousness occurs, which is accompanied by symptoms similar to those of intoxication, you should reduce the amount of berries eaten or change the place of collection. It is believed that a similar effect may occur due to the proximity of wild blueberries with wild rosemary, as a result of which the essential oils of poisonous wild rosemary may accidentally appear on harmless blueberries.

Selection and storage

When buying blueberries, you should choose uniformly colored berries (without red "poles"), not neglecting fruits with a whitish coating, since this is a natural coating that protects the skin of the fruit. To preserve the protective layer, blueberries should only be washed immediately before eating. Organic berries generally can not be washed if the manufacturer (seller) is trustworthy.

After harvest, blueberries, unlike many other products, no longer ripen, so it is important that the harvest is carried out at the optimal interval (this is another reason to trust the producer). If, after full staining, the berries are left on the bush for up to a week, then under favorable weather conditions, both the mass and the amount of sugars in the fruits will increase. But if blueberries are harvested late, their density decreases, and they can be damaged during transportation, which is also desirable to pay attention to when choosing.

Before buying, to make sure there are no mold or ice crystals (when it comes to frozen berries), the blueberries in the container should be shaken slightly: the fruits should not stick together.

Store fresh berries in a sealed container in the refrigerator. At a temperature of +2/+4°C and a humidity of 80-95%, blueberries can lie without loss for up to 3 weeks, and at a temperature of 0°C - up to one and a half months, although it is believed that the fresher the fruit, the more aromatic and tastier they are.

Long-term storage involves freezing the berries. The optimal conditions for this are temperatures from 0 to -1°C and humidity in the range of 90-95%. Studies have shown that frozen blueberries retain most of their anthocyanin content.

At home, blueberries are harvested by drying the berries laid out in one layer in the sun. A day later, after the fruits have dried, they are transferred to the shade, to a room with good ventilation or under sheds and dried, turning over from time to time to prevent rotting and mold. Sometimes the berries are dried in ovens or ovens.

In production, to extend the shelf life of blueberries, a modified gas environment is used, which is created in sealed bags, and shock freezing with a stream of cold (up to -40 ° C) air. Then, when the internal temperature of the berry reaches -20°C, the berries are transferred to a freezer with a temperature of about -18°C.

In part, it is the ability to save blueberries for the future that leads to the fact that blueberry prices break all records even in season. Substandard blueberries also do not disappear - they are processed into jams and juice. In addition, investments in infrastructure for cooling, sorting, packaging, processing fruits, for their part, increase the cost of the product. However, this is not the main and not the only reason for the high price of blueberries.

Why are blueberries so expensive?

The market price of blueberries is influenced by many parameters, the combination of which leads to the fact that the demand for this berry systematically exceeds supply. Here are just a few factors that affect pricing:

Possibility to send blueberries to foreign markets with greater profit.

The "geography" of blueberry consumption is constantly expanding, including through countries that do not have their own plantations. For example, Ukraine, which has been regularly and rapidly

increasing the area of blueberry plantations for several years in a row (recently taking second place after Peru in this parameter), exports berries on an industrial scale to Europe, Asia, and the Middle East. But even in countries with their traditionally large plantations, from time to time, due to weather conditions or diseases, crop failures occur, increasing the opportunities for competitive exports. Particularly strongly export-oriented are the products of organic berries, blueberries from which are rarely and expensively sold domestically.

- Growing features.

Blueberries are a very beneficial berry, but in the long run. This shrub takes a relatively long time to reach full fruiting, but it also gives crops longer than, for example, strawberries, raspberries or blackberries, which begin to make a profit very quickly. However, the need for long-term non-profit investments is also reflected in the price, increasing the cost of goods.

- Harvest characteristics.

The blueberries that hit the shelves are, of course, not a wild berry that needs to be found. Modern plantations are specially organized for convenient and, in part, mechanized harvesting. For example, in the USA and the Netherlands, special trailed and self-propelled harvesters are produced for these purposes. But picking blueberries is still a laborious process. The fruits of this plant do not ripen at the same time, and on the same bush there are both ripe and still green berries. Therefore, usually the first two or three collections are carried out manually and only the final one is mechanized. At the same time, the fruits harvested by machines are often damaged and they still have to be sorted and cleaned additionally. As a result of this, there is often a banal problem of "lack of hands" that countries that grow berries regularly face.

Varieties and cultivation

Almost all modern cultivars, of which there are about two hundred today, are hybrids of crossing different types of American blueberries. We have the most popular group of varieties of **northern tall blueberries**. Such plants withstand low temperatures down to about $-30-35^{\circ}\text{C}$, in contrast, for example, from the **southern tall plant**, which tolerates temperatures down to -5°C , and even more so, from **Ashe blueberries** with frost resistance down to 0°C .

But as examples of blueberry varieties, we will give here those that are distinguished by the highest content of anthocyanin in berries:

- **O'Neal**. Represents a group of varieties of tall southern blueberries, among which it is considered the most fragrant (fragrant) variety. O'Neal produces large, dark blue fruits that ripen early. In mild winters, it retains beautiful gray-green foliage, but in cold climates, the leaves change color to bright red before shedding.
- **bluecrop**. The reference industrial variety with abundant fruiting has been known since 1952. Slightly flattened berries reach 17-20 mm in diameter. They ripen to blue with a pronounced light blue bloom. They do not crack and tolerate transportation and storage well. Bluecrop is characterized by a bright tart taste, but if harvested early or there are too many berries on the bush, it can turn out to be sour.
- **Bluejay**. The variety was bred in the USA back in 1952, and transferred to production in 1977. It is a unique mixture of old varieties (Pioneer, Grower, Stanley, Brooks) with forest plant populations. In good conditions, the berries can reach 20 mm in diameter and weigh up to 4 grams. Very dense light blue fruits with a slight wax coating have a wine-sweet taste with a slight sourness. It is convenient in organizing the harvest in that up to 70% of the berries ripen almost simultaneously, after which they do not crumble for a long time.

- **Brigitte Blue.** The berries of this variety grow up to 15 mm in diameter and have a sweet and sour taste. Brigitta Blue enters fruiting in the fourth year, after which it shows a regular yield of about 4-6 kg per bush (in the conditions of the middle lane, the bush grows to 1.8-2 meters).

Early-ripening varieties give a harvest in the first half of July, late-ripening - in the first half of August. At the same time, the cultivation of any blueberry requires strict adherence to certain conditions:

- **Soil for blueberries.** The plant needs acidic soils with a pH level of 3.8-5 (no higher than 5.5). When planting shrubs, it is necessary to introduce a soil mixture consisting mainly of acid peat with the addition of leaf humus and coniferous litter (in a ratio of 5:2:1). After that, the soil is usually mulched with sawdust or bark (about 10-15 cm). There is a widespread (though not indisputable) opinion that the love for acidic soil arose in this plant due to symbiosis with fungi. Blueberry roots are devoid of thin suction hairs, but are densely braided with fungal threads that help the plant consume nutrients.
- **Planting blueberries.** This will require a hole meter in diameter with a depth of about 60 cm. Under the next bush of tall blueberries, a hole is dug no closer than 2 meters from the previous one. The plant is demanding on moisture (neither drying out nor flooding is allowed), therefore, a shrub is planted in well-drained and moistened soil. A windless, well-lit area is selected. Blueberries grow well in partial shade, but a shrub planted in the sun produces larger and sweeter berries.
- **Blueberry seedlings.** Varieties for planting are selected based on the given climatic conditions. For cultivation in private gardens, attention is paid not only to the taste of the berry and yield, but also to the decorative attractiveness of the bush. The industrial approach takes into account the size and taste of the berry, its ability to endure transportation, the sequence of fruit ripening on the bush, etc.
- **Care.** During dry periods, blueberries are watered at least once a week in the amount of 10-20 liters per bush. If the water is hard, with a lot of alkali, it is acidified with vinegar before watering in a ratio of about 1 tsp. for 2 liters of water. To improve fruiting in early spring, pruning of bushes is carried out. Potassium-phosphorus fertilizers are applied in autumn, nitrogen fertilizers are applied in spring and early summer.

In recent years, growing blueberries in container pots has become increasingly popular, which makes it possible to create optimal soil conditions and provide the plant with constant light.

Despite the increase in popularity, in our country, blueberries remain an expensive and delicacy product, which, nevertheless, is still in demand. Its fruits are justifiably valued for both taste and medicinal properties. And although it is too early to call blueberries a real medicine, the benefits of eating these berries are definitely more than harm.

Literature

1. US National Nutrient Database, [source](#)
2. Ana Rodriguez-Mateos, Tania Cifuentes-Gomez, Setareh Tabatabaee, Caroline Lecras, and Jeremy P.E. Spencer. Procyanidin, Anthocyanin, and Chlorogenic Acid Contents of Highbush and Lowbush Blueberries. *J Agric Food Chem.* 2012 Jun 13;60(23):5772-8. doi:10.1021/jf203812w.
3. Sun Y, Li M, Mitra S, Hafiz Muhammad R, Debnath B, Lu X, Jian H, Qiu D. Comparative Phytochemical Profiles and Antioxidant Enzyme Activity Analyzes of the Southern Highbush Blueberry (*Vaccinium corymbosum*) at Different Developmental Stages. *Molecules.* 2018 Aug 31;23(9):2209. doi: 10.3390/molecules23092209.

4. Lee BL, Kang JH, Kim HM, Jeong SH, Jang DS, Jang YP, Choung SY. Polyphenol-enriched *Vaccinium uliginosum* L. fractions reduce retinal damage induced by blue light in A2E-laden ARPE19 cell cultures and mice. *Nutr Res.* 2016 Dec;36(12):1402-1414. doi: 10.1016/j.nutres.2016.11.008. Epub 2016 Nov 18.
5. Zu XY, Zhang ZY, Zhang XW, Yoshioka M, Yang YN, Li J. Anthocyanins extracted from Chinese blueberry (*Vaccinium uliginosum* L.) and its anticancer effects on DLD-1 and COLO205 cells. *Chin Med J (Engl).* 2010 Oct;123(19):2714-9.
6. Pervin M, Hasnat MA, Lim JH, Lee YM, Kim EO, Um BH, Lim BO. Preventive and therapeutic effects of blueberry (*Vaccinium corymbosum*) extract against DSS-induced ulcerative colitis by regulation of antioxidant and inflammatory mediators. *J Nutr Biochem.* 2016 Feb;28: 103-13. doi: 10.1016/j.jnutbio.2015.10.006. Epub 2015 Oct 26.
7. Peter J Curtis, Vera van der Velpen, Lindsey Berends, Amy Jennings, Martin Feelisch, A Margot Umpleby, Mark Evans, Bernadette O Fernandez, Mia S Meiss, Magdalena Minnion, John Potter, Anne-Marie Minihane, Colin D Kay, Eric B Rimm, Aedin Cassidy. Blueberries improve biomarkers of cardiometabolic function in participants with metabolic syndrome—results from a 6-month, double-blind, randomized controlled trial. *The American Journal of Clinical Nutrition*, Volume 109, Issue 6, June 2019, Pages 1535–1545, <https://doi.org/10.1093/ajcn/nqy380>.
8. JA Joseph, B Shukitt-Hale, NA Denisova, D Bielinski, A Martin, JJ McEwen, PC Bickford. Reversals of Age-Related Declines in Neuronal Signal Transduction, Cognitive, and Motor Behavioral Deficits With Blueberry, Spinach, or Strawberry Dietary Supplementation. *J Neurosci.* 1999 Sep 15;19(18):8114-21. doi: 10.1523/JNEUROSCI.19-18-08114.1999.
9. Shi D, Xu M, Ren M, Pan E, Luo C, Zhang W, Tang Q. Immunomodulatory Effect of Flavonoids of Blueberry (*Vaccinium corymbosum* L.) Leaves via the NF- κ B Signal Pathway in LPS-Stimulated RAW 264.7 Cells. *J Immunol Res.* 2017;2017:5476903 . doi: 10.1155/2017/5476903. Epub 2017 Dec 27.
10. Vademec, [source](#)
11. Park CY, Gu N, Lim CY, Oh JH, Chang M, Kim M, Rhee MY. The effect of *Vaccinium uliginosum* extract on tablet computer-induced asthenopia: a randomized placebo-controlled study. *BMC Complement Altern Med.* 2016 Aug 18;16:296 . doi: 10.1186/s12906-016-1283-x.
12. Liu J., Zhang W., Jing H., Popovich DG Bog Bilberry (*Vaccinium uliginosum* L.) Extract Reduces Cultured Hep-G2, Caco-2, and 3T3-L1 Cell Viability, Affects Cell Cycle Progression, and Has Variable Effects on membrane permeability. *Journal of Food Science* 75(3):H103-7, April 2010. DOI: 10.1111/j.1750-3841.2010.01546.x
13. Oliveira PS, Gazal M, Flores NP, Zimmer AR, Chaves VC, Reginatto FH, Kaster MP, Tavares RG, Spanevello RM, Lencina CL, Stefanello FM. . *Vaccinium virgatum* fruit extract as an important adjuvant in biochemical and behavioral alterations observed in animal model of metabolic syndrome. *Biomed Pharmacother.* 2017 Apr;88: 939-947. doi: 10.1016/j.biopha.2017.01.121.
14. New English-Russian Biological Dictionary. "RUSSO", 2003, Chibisova O.I., Smirnov N.N. and others. 72 thousand articles.

[An extended HTML version of this article](#) is available on the edaplust.info website.

Blueberry - useful properties, composition and contraindications

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

Alena Tarantul, nutritionist

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

Received 07/17/20

Abstract. The article discusses the main properties of blueberries 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 blueberries in various types of medicine and the effectiveness of its use in various diseases are considered. The potentially adverse effects of blueberries on the human body under certain medical conditions and diseases are analyzed separately. Considered scientific basics diets With her application.



Melon (lat. *Cucumis melo*)

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

Yampolsky Alexey, nutritionist

Email: eliseeva.t@edaplust.info, yampolsky.a@edaplust.info

Abstract. The article discusses the main properties of melon 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 melon in various types of medicine and the effectiveness of its use in various diseases are considered. The potentially adverse effects of melon on the human body under certain medical conditions and diseases are analyzed separately. The scientific foundations of diets with its application are considered.

Keywords: melon, benefit, harm, beneficial properties, contraindications

Beneficial features

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

Main substances (g / 100 g):	Fresh honey [1]
Water	89.82
Carbohydrates	9.09
Sugar	8.12
Alimentary fiber	0.8
Squirrels	0.54
Fats	0.14
Calories (kcal)	36
Minerals (mg/100 g):	
Potassium	228

Sodium	eighteen
Phosphorus	eleven
Magnesium	ten
Calcium	6
Iron	0.17
Zinc	0.09
Copper	0.024
Vitamins (mg/100 g):	
Vitamin C	eighteen
Vitamin PP	0.418
Vitamin B6	0.088
Vitamin B1	0.038
Vitamin E	0.02
Vitamin B2	0.012

The above table for honey melon shows that its pulp contains a wide range of vitamins and minerals, but almost all of them are presented in a relatively small amount in relation to the recommended daily requirement - % RDP / 100 g. (For another popular plant variety - cantaloupe melon - figures may differ slightly).

In the list of minerals, the potassium content is most noticeable (about 10% RSP). But the iron, for which the melon is often praised, in the pulp, as a rule, is only 0.17-0.21 mg / 100 g, which corresponds to about 1.5-2% RSP (although in some varieties this percentage can reach 7% RSP). There are quite a lot of vitamins C in the fruits (20-40% RSP), there are also vitamins B1, B6, B9, PP (about 4% RSP). Melon is also distinguished by the content of beta-carotene (provitamin vitamin A) - up to 40% RSP. A number of essential amino acids were also found in melon pulp: valine, histidine, leucine, lysine, isoleucine, etc. (1-2% RSP).

Medicinal properties

Despite the fact that the medicinal properties of various parts of the melon have been known since ancient times, modern science is also interested in them, rechecking the statements of ancient doctors.

So, for example, there are several works at once, in which the antitumor effects of the properties of the peel of fruits, seeds ^[2] and melon stems are proved. A triterpenoid compound isolated from the stems of the plant (cucurbitacin B) has been tried in China for some time in the treatment of hepatitis and hepatoma (hepatocellular cancer), and new work with cucurbitacin B confirms its therapeutic efficacy. ^[3]

Due to their antioxidant properties, melon extracts also show an anti-hemolytic effect, that is, their administration can stop the premature breakdown of red blood cells. ^[4] It is found that melon pulp, when consumed regularly, has an anti-atherosclerotic effect on blood vessels. A number of studies have documented the ability of melon extracts to prevent abnormal increases in blood glucose levels, as well as the levels of lipoproteins and lipids. Together, this makes it possible to use extracts of parts of the plant to alleviate the condition of patients with cardiovascular diseases and type 2 diabetes.

- Diabetes

Diabetes mellitus is usually a contraindication to melon dietary intake due to the sugars in the fruit, but animal experiments have shown that oral administration of melon to obese mice results in improved

inflammatory status associated with altered gut microbiota and then improved glycemic control. And this has the potential to prevent the development of insulin resistance in type 2 diabetes. ^[5]

Another study showed that taking melon-based products (especially with date preparations) had a hypoglycemic effect, attenuating primary heart muscle pathologies in diabetic rats.

Melon leaf extract is also likely to have the potential to prevent damage to the nervous system and inhibit the growth of cognitive impairment in animals with diabetes mellitus (more on this and previous research, see below).

- Cardiovascular pathologies.

As far back as the end of the last century, studies have shown that an aqueous melon extract is able to inhibit platelet aggregation, thereby potentially preventing the formation of blood clots in the vessels. ^[6] More recent experiments in rats have shown that consumption of melon concentrate may have therapeutic benefits in preventing myocardial hypertrophy and inhibiting cardiac fibrosis. ^[7]

Due to its diuretic properties, melon can be considered as a herbal remedy for high blood pressure. In one synthesis study, melon extract was named as one of the most promising concentrates for the development of natural drugs with a diuretic effect. ^[eight]

Published data suggest that melon consumption has a sedative effect on the central nervous system, melon peel extracts can stimulate thyroid function ^[9], and a combination preparation with pulp extract when applied externally can provide safe repigmentation in people with vitiligo. Sometimes melon is included in the complex diet of patients with anemia, hemorrhoids.

Use in medicine

Today on the market there are a number of preparations with melon extract, belonging to the group of nutritional supplements. Manufacturers of dietary supplements position their products primarily as antidiabetic agents that help maintain normal blood sugar levels by ensuring proper glucose metabolism. Additional therapeutic effects include lowering blood pressure and an antioxidant effect. Such preparations are most often made from wild bitter melon (Wild Bitter Melon), but cantaloupe melon fruit extracts are also found.

In folk medicine

Ancient folk medicine (on the postulates of which the first systematized medical theories and practices were based) attributed melon to products that, with regular use, can cleanse internal organs, nourish the body and saturate the brain with moisture. Thanks to these properties, melon pulp treated jaundice and dropsy, provoked menstruation with a delay, increased the amount of milk in lactating women, relieved edema and restored kidney function.

Folk "herbalists" prescribed to eat melon pulp to improve mood (as an antidepressant), for stomach problems, scurvy, tuberculosis, hemorrhoids, rheumatism, gout.

The people have traditionally distinguished the medical effects of weed field and varietal sweet and unsweetened melons. Weed field melon was used to get rid of a very wide range of diseases and pathologies:

- To get rid of epileptic seizures, paralytic spasms (including on the face), tetanus and headaches. With migraines, to relieve attacks, melon juice thickened in the sun was mixed with the milk of

nurses and injected into the nose of the patient. In the treatment of epilepsy, the thickened juice of a field melon mixed with milk was also used, however, before the introduction of the mixture, the body had to be cleansed first. A mixture of milk with leaf juice or just the leaves of the plant was considered more effective. Often, milk was replaced (or supplemented) with ammonia.

- For excretion of bile (with feces), urine and uric acids (in gout treatment programs). Cholagogue and diuretic effects were achieved by drinking fruit juice (about 1 gram per dose). But by increasing the dose of juice to 3 grams for three days, it was possible to achieve the excretion of bile already through vomiting.
- For the treatment of colds and eliminate their symptoms. Ancient folk healers believed that drunk fruit juice in its pure form would ease labored breathing. And if you mix it with olive oil and anoint your neck or palate with this mixture, it will help get rid of a sore throat.

From unsweetened melons, poultices were prepared for inflammation of the eyes. And its dried and powdered pulp, mixed with wheat flour, removed freckles, age spots and various skin pathologies. However, in addition to the pulp, melon peels, seeds, flowers, leaves, stems and roots have long been used in folk medicine.

- **Corky.** Folk healers used to lubricate the body with melon peels to provoke urination, and the head to eliminate inflammation in meningitis. Eating 5-7 grams of crushed crusts was used to remove bladder and kidney stones. And to activate the movement of feces, it was recommended to eat about 5-6 grams of the peel of field melon fruits daily, washing down the healing agent with honey water.
- **flowers.** The dried flowers of the plant were ground into powder, which was then sprinkled with lichen. To eliminate various skin diseases, warts, spots, itching, honey, wine or vinegar was added to the powder of flowers. Sometimes flower powder fought with joint pain.
- **Seeds.** In traditional medicine, it was believed that melon seeds (and juices of crushed seeds) in a dose of 7 to 17 grams increase male potency, add milk to lactating women, open the channels of the kidneys, liver, and bladder. Seed milk relieved inflammation, treated eye diseases and removed freckles. They were eaten raw to relieve fever and relieve coughs and thirst.
- **Leaves.** A decoction of melon leaves was drunk to treat leprosy (leprosy) - a disease caused by mycobacterium (*Mycobacterium leprae*).
- **Roots.** Melon root is considered a strong emetic, but it is used not only in this capacity.
 - For the treatment of dropsy, 150 grams of crushed plant roots were infused with 1 liter of wine for a week. With a therapeutic effect, the drug should be used three times a day, 100 ml each. For external use in dropsy, melon roots were first boiled in water, ground and, mixed with wine, added to the dough, which was applied to the accumulation of transudate.
 - The juice of the plant roots was used to get rid of helminths. To do this, it was slightly warmed up and applied to the navel. Lubricating the testicles with juice should have led to a decrease in pain and swelling of the glands. The same condensed juice of the roots activated menstruation. However, its introduction directly into the vagina of a pregnant woman could provoke a miscarriage.
 - A compress of boiled roots mixed with barley flour contributed to the faster maturation of inflammation on mucous surfaces.
 - Enemas from a decoction of the roots (up to 3.5 grams of concentrate) were put by traditional healers for treatment radiculitis. External compresses soaked in root decoction and vinegar were treated for gout and joint pain.

in oriental medicine

In Chinese dietology, melon refers to foods that have an average concentration of Yin. As a cold product, it quenches thirst and relieves the heat of inflammation. Melon is used in case of lack of appetite, discomfort in the chest area, with problems with the excretion of urine and toxins.

Abuse of melon can provoke acute diarrhea. But, in addition, it drains the Yang energy and can create an internal accumulation of cold.

In traditional Indian medicine, melon fruits have been used to treat diabetes, liver disease, heart disease, and obesity.

In scientific research

Melon has not yet become a popular object of scientific research, especially the part that is associated with a therapeutic effect on the human body. However, from time to time this melon culture still falls into the field of view of scientists.

Melon extract as part of a complex preparation has shown effectiveness in the treatment of vitiligo. ^[ten]

In this study, scientists wanted to evaluate the effectiveness of topical application of a new gel composition containing melon extract, phenylalanine and acetylcysteine in vitiligo (pigmentation disorders due to the lack of melanin in some areas of the skin). The safety of the drug was also checked (including when using 0.05% ointment with clobetasol).

Scientists examined 149 patients suffering from symmetrical vitiligo affecting less than 10% of the skin surface. (Patients affected only by the vital coil were excluded from the analysis). The duration of treatment was 12 weeks, after which excellent repigmentation (> 75%) was achieved in 38-73% of patients, depending on the treatment regimen. Minor to moderate side effects were observed only in patients using an additional 0.05% clobetasol ointment. When used alone, the tested gel composition showed good efficacy in improving the repigmentation of vitiligo, and no side effects were recorded.

Melon leaf extract reduces the degree of damage to the nervous system and cognitive impairment in animals with streptozotocin-induced diabetes. ^[eleven]

Since the central nervous system is considered one of the most vulnerable targets of oxidative stress in diabetes, scientists are looking at ways to provide antioxidant protection to the brain through healthy foods and herbal supplements, such as melon leaf extract.

In the experiment, adult male albino rats were divided into 5 groups of 6 rats each. In 4 groups, diabetes was induced by a single intraperitoneal injection of streptozotocin (STZ; 60 mg/kg body weight), and the 5th group was the control group.

One of the four diabetic groups was left untreated and considered the diabetic control group, while the other three groups were treated with melon leaf extract at doses of 30, 60, and 120 mg/kg bw for 30 days.

After completion of the experiment, plasma and brain were used to assess biochemical changes. The data obtained showed that treatment with melon leaf extract reduced blood glucose, glycated hemoglobin, brain tumor necrosis factor, interleukin levels, brain malondialdehyde content, and caspase-3 activity. In addition, the treatment resulted in marked increases in plasma levels of dopamine, melatonin, brain endothelial growth factor A, brain catalase, and superoxide dismutase.

Based on their findings, the researchers concluded that melon leaf extract has a neuroprotective effect against oxidative damage associated with diabetes.

Melon serpentine has a preventive effect against the development of cardiomyopathy in diabetic rats. ^[12]

Cardiomyopathies are pathologies that affect the middle layer of the muscle fibers of the heart. One of the causes of such pathologies can be endocrine diseases and in particular diabetes mellitus.

In this study, scientists tested the ability of aqueous extracts of serpentine melon (*Cucumis melo* var. *Flexuosus*) and date fruits to suppress type 2 diabetes-induced cardiomyopathy in laboratory rats.

Plant extracts (together and separately) at the rate of 200 mg/kg of body weight in diabetic rats were taken daily for a month. The results showed that both individual agents and combinations significantly reduced glucose levels and increased blood insulin concentrations. Plant extracts significantly reduced serum inflammatory molecules, tumor necrosis factor (TNF- α) and C-reactive protein (CRP), as well as changes in cardiac malondialdehyde (MDA) and glutathione peroxidase (GPx). In addition, the extracts attenuated an increase in the cardiac apoptosis enzyme (caspase-3) and oxidative DNA fragmentation. Treatment of diabetic rats with herbal extracts also reduced the levels of the serum cardiac function enzyme, creatine phosphokinase-MB (CPK-MB).

This study proved that both herbal extracts and especially their combination have a potential hypoglycemic effect and can attenuate cardiomyopathy in diabetic rats.

Weight regulation

Due to the rather high content of fast carbohydrates - sugars (about 8-9 g per 100 g of product), melon is not considered a dietary product. But melon methanol extracts (500mg/kg) in some animal studies on high cholesterol diets have shown the ability to slow weight gain, lower low-density ("bad") cholesterol while increasing high-density cholesterol ("good") in serum as early as 28 days after the start of treatment. ^[13]

Often, a 1-3 day mono-diet is built on the basis of melon. Usually unsweetened fruits are chosen for her and 1-1.5 kg of pulp per day is divided into 5-6 meals. Drinking melon is not recommended, but in between meals, those who have experienced a diet are advised to drink a cup of herbal tea.

In cooking

Most often, the melon is eaten fresh, chilled, removing the inedible peel and cutting the flesh into slices of a cubic or spherical shape. Before cooking, for stability, the "poles" of the fruit are usually cut off. But the order of cutting off the remaining crust depends on what exactly the cook intends to do: for example, it is more convenient to make melon balls without pre-peeling, and fruit and vegetable salads and dishes after removing the peel.

The peeled skin is also not always thrown away, as it can be an excellent softener for tough meat. When cooking dishes, the peel is thrown directly into the pan in which the meat is cooked. And when preparing raw materials for barbecue, with the addition of a peel, it will be possible to marinate the meat of even old animals well.

Despite the widespread opinion among the people that it is better to eat melon separately from other products to maintain normal digestion, the culinary traditions of the peoples of the world are not so unambiguous on this score. For example, in England it is customary to serve melon for breakfast, in the USA - at the beginning of lunch to eat it with "dense" dishes, and in Central Asia, meat and fish are traditionally cooked with melon. The combination of ham with fruit pulp has become a classic today in many cuisines of the world. And the melon taste goes very well with the taste of seafood, various herbs, spices, berries.

Depending on the type and variety, the culinary purpose of melons may vary: "Galia", "Kassaba", "Kreshno" are good for desserts or snacks, winter melons are more appropriate in soups and seafood dishes, "Bukharka" with its pear-like shade can become a fragrant basis for homemade wine. (By the way, although delicious alcoholic drinks are made from the melon pulp, it is believed that preparing wine from grapes should not be placed next to fragrant fruits - the melon smell will spoil it).

In cosmetology

In cosmetology, melon extracts are used to even out skin tone, protect against the sun, moisturize and relieve inflammation, as well as to normalize the production of sebum. Celebrity supermodel Cindy Crawford uses the Charente melon, native to the south of France, as one of the main ingredients in her "Meaningful Beauty" cosmetic line. Cosmetics of this line are intended for mature women who are interested in the antioxidant properties of melon products and the restoration of skin elasticity.

But not only Cindy Crawford includes melon extracts in her products. Leading cosmetic companies in Europe, Asia and America use similar ingredients in creams, serums, eau de toilette, shampoos and soaps. Moreover, the use of melon components in hair care is not an invention of recent years. Residents of the highlands of Tajikistan have been using fruit seeds for a long time as a shampoo that softens hair and removes dandruff.

In modern home cosmetology, melon pulp is mainly used, including it in complex masks:

- with lemon - to lighten age spots,
- with honey, sour cream and egg yolk - to increase tone and smooth fine wrinkles,
- with milk and mineral water - for moisturizing, although often for this purpose the face is simply wiped with ground and squeezed pulp collected in a gauze bundle.

Dangerous properties of melon and contraindications

Melon is contraindicated in people with peptic ulcers of the gastrointestinal tract, patients with gastritis, intestinal disorders. The abundance of sugars in fruits requires special control over the diet of people with diabetes.

There are a number of restrictions on the compatibility of melon with other products. Melon should not be washed down with milk, kefir, fermented baked milk, alcoholic beverages and even water.

Due to the potential development of pathologies of the digestive system in a child on breastfeeding, melon is recommended to be carefully introduced into the diet of nursing mothers.

It is dangerous to eat fruits with a damaged peel, because pathogens can easily penetrate into the pulp through it.

Nitrates easily accumulate in the melon (especially in the layer near the peel), so if you suspect a high concentration of chemistry, you should either refuse to eat or eat the pulp closer to the center.

Men, seeking to normalize erectile function, often abuse melon seeds, eating more than 5 grams per day. It is believed that this can lead to problems with the spleen.

Selection and storage

Today on the shelves you can find many different varieties of melons, differing in color, size, shape. But there are several universal indicators of product ripeness:

- **Smell.** A ripe melon should have a strong aroma.
- **Fetal weight.** A ripe melon will be heavier than it looks. In addition, it can be compared with the weight of other fruits of the same size and variety - and choose the heaviest.
- **Elasticity.** A very hard crust is a sign of an immature fruit. In a ripe melon, when pressed with a finger, the peel will be slightly crushed.
- **Sound.** When tapping the sides of the melon with the palm of your hand, it should make a hollow sound.

The general rules for the storage of melons involve the preliminary selection of fruits without damage to the peel and initial signs of decay.

Uzbek experience shows that, in general, melons are best kept hanging in a ventilated wicker net so that the fruits do not touch each other. But if there is no suitable beam for this, melons can be placed in boxes on soft sawdust at a small distance from each other. The desired effect will help to achieve and shifting the fruit with paper or cloth. From time to time (about once every 3-4 weeks) they need to be checked and fruits should be discarded, on the peel of which dark spots began to appear.

Melons are perfectly stored in dark rooms with a fairly low temperature (1-3 ° C) at a relative humidity of 70-80%. But even under ideal conditions, late-ripening varieties will be better stored: Khabalon, Zimovka, Chiano, etc. Some fruits can lie for up to six months, but melons should not be placed next to apples or potatoes, which accelerate ripening. Without special temperature conditions, an uncut melon will retain its freshness for at least a week if it is not placed in direct sunlight.

Frozen melon cut into pieces can also be stored for a very long time (until the next harvest). After defrosting, the pulp changes its physical properties, while maintaining aroma and taste. But if the cut melon is not frozen, then even in the refrigerator it should not be kept for more than a week. In this case, it is better to cover the slices with cling film to prevent drying.

If there is no space in the refrigerator, the melon can be dried and wilted. Often unsuccessfully selected unripe or dryish fruits are dried. Firstly, they do not have to be thrown away, and, secondly, they will cook faster than juicy ones. To do this, the pulp is cut into long slices 1-3 cm thick, getting rid of the green layer near the peel, laid out on a wire rack or baking sheet covered with parchment, and then either placed in the oven to speed up the process, or kept for about 2 weeks in air for natural wilting.

In the first case, the temperature in the oven should be around 70-75°C, taking into account the slightly ajar door for the release of vapors. Cooking time - up to 8 hours. If the slices are not placed on the grate, but on a baking sheet, then it is better to change the baking paper regularly (in the first hours it will get wet very quickly). In the case of natural air drying, cut slices should be covered with cheesecloth to protect against insects and gently turned every 2 days during the entire 2 weeks of cooking.

The resulting dried strips are stored in a closed jar (glass, plastic, wooden). To make the slices less sticky, they are rolled in sesame seeds, coconut flakes, poppy seeds, or lightly sprinkled with watermelon juice. Sometimes they are folded into pigtails or rolls.

Varieties and cultivation

The melon loves light and heat, tolerates saline soil and drought, and almost does not tolerate high humidity. And although in the Russian Empire in the 17th century they successfully tried to grow it in greenhouse conditions even in the suburbs, it still grows better in the dry Asian climate on open melons.

There are many varieties and varieties of melons, among which there are quite exotic representatives. All of them belong to the genus *Cucumis* of the Pumpkin family, so it is not surprising that the word “cucumber” is found in the alternative names of some of them, and the melon fruits themselves are usually called “pumpkins”.

- **Serpentine melon, or Armenian cucumber.** It has very elongated fruits, the longest specimens of which grow more than a meter, although the average length is about 50 cm. It is harvested at a young age, but if the pumpkin is allowed to ripen, it acquires a characteristic melon aroma.
- **Horned melon Kiwano, or African cucumber.** Outwardly, the fruits are similar to the usual melon in color and size, but differ in growths-thorns. The flesh of the kiwano is generally more like a green jelly with numerous seeds of a pale green color.
- **Tiger Melon, or Pomegranate, or Fragrant, or Queen Anne's Pocket.** In all these cases, we are talking about Queen Anne's Pocket pumpkins. Their stripes on the skin really resemble a brindle color, and the size (up to 8 cm in diameter) is so small that they can fit in a pocket. It is believed that the ladies of the Victorian era actually put melons in the pockets of their dresses for the strong pleasant aroma.

Literature

1. US National Nutrient Database, [source](#)
2. Rolim PM, Fidelis GP, Padilha CEA, Santos ES, Rocha HAO, Macedo GR Phenolic profile and antioxidant activity from peels and seeds of melon (*Cucumis melo* L. var. *reticulatus*) and their antiproliferative effect in cancer cells - *Braz. J. Med. Biol. Res.* 2018, Mar 1, 51(4), e6069. doi: 10.1590/1414-431X20176069.
3. Yang T., Liu J., Yang M., Huang N., Zhong Y., Zeng T., Wei R., Wu Z., Xiao C., Cao X., Li M., Li L., Han B., Yu X., Li H., Zou Q. Cucurbitacin B exerts anti-cancer activities in human multiple myeloma cells in vitro and in vivo by modulating multiple cellular pathways - *Oncotarget*. 2017, Jan 24, 8(4), 5800-5813. doi: 10.18632/oncotarget.10584.
4. Khalili M., Ebrahimzadeh MA, Safdari Y. Antihaemolytic activity of thirty herbal extracts in mouse red blood cells - *Arh. High Rada. Toksikol.* 2014, Dec., 65(4), 399-406. doi: 10.2478/10004-1254-65-2014-2513.
5. Lee D., Yoo JH, Lee BC Therapeutic Effect of *Cucumis melo* L. extract on Insulin Resistance and the Gut Microbiome in Lepob/Lepob Mice - *Evid. Based complement. Alternat. Med.* 2018, Feb 5, 2018, 8159261. doi: 10.1155/2018/8159261.
6. Altman R., Rouvier J., Weisenberger H. Identification of platelet inhibitor present in the melon (*Cucurbitacea cucumis melo*) - *Thromb. haemost.* 1985, Jun 24, 53(3), 312-313.
7. Carillon J., Gauthier A., Barial S., Tournier M., Gayraud N., Lajoix AD, Jover B. Relaxin and atrial natriuretic peptide pathways participate in the anti-fibrotic effect of a melon concentrate in spontaneously hypertensive rats - *Food Nutr. Res.* 2016, Apr 12, 60, 30985. doi: 10.3402/fnr.v 60.30985.
8. Wright CI, Van-Buren L., Kroner CI, Koning MM Herbal medicines as diuretics: a review of the scientific evidence - *J. Ethnopharmacol.* 2007, Oct 8, 114(1), 1-31. doi: 10.1016/j.jep.2007.07.023.
9. Parmar HS, Kar A. Protective role of *Mangifera indica*, *Cucumis melo* and *Citrullus vulgaris* peel extracts in chemically induced hypothyroidism - *Chem. Biol. Interact.* 2009, Feb 12, 177(3), 254-258. doi.org/10.1016/j.cbi.2008.11.006.
10. Buggiani G., Tsampau D., Hercogova J., Rossi R., Brazzini B., Lotti T. Clinical efficacy of a novel topical formulation for vitiligo: compared evaluation of different treatment modalities in 149 patients - *Dermatol. Ther.* 2012, Sep., 25(5), 472-476. doi: 10.1111/j.1529-8019.2012.01484.x.

11. Ibrahim DS Neuroprotective effect of Cucumis melo Var. flexuosus leaf extract on the brains of rats with streptozotocin-induced diabetes - Metab. brain. Dis. 2017, Feb., 32(1), 69-75. doi: 10.1007/s11011-016-9886-y.
12. Saddi AA, Mohamed AM, Shaikh AM Prophylactic mechanisms of Cucumis melo var. flexuosus and Phoenix dactylifera fruit extracts against diabetic cardiomyopathy in streptozotocin induced diabetic rats - Pak. J Pharm. sci. 2018, Mar., 31(2(Suppl.)), 699-707.
13. Bidkar JS, Ghanwat DD, Bhujbal MD, Dama GY Anti-hyperlipidemic activity of Cucumis melo fruit peel extracts in high cholesterol diet induced hyperlipidemia in rats - J. Complement. integration Med. 2012, Sep 24, 9(1), Article 22. doi: 10.1515/1553-3840.1580.
14. Longest snake melon, [source](#)

[An extended HTML version of this article](#) is available on the edaplust.info website.

Melon - 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

Received 08/02/20

Abstract. The article discusses the main properties of melon 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 melon in various types of medicine and the effectiveness of its use in various diseases are considered. The potentially adverse effects of melon on the human body under certain medical conditions and diseases are analyzed separately. Considered scientific basics diets With her application.



Blackberry (lat. Rubus caesius)

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

Yampolsky Alexey, nutritionist

Email: eliseeva.t@edaplust.info, yampolsky.a@edaplust.info

Abstract. The article discusses the main properties of blackberries 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 blackberries in various types of medicine and the effectiveness of its use in various diseases are considered. The potentially adverse effects of blackberries on the human body under certain medical conditions and diseases are analyzed separately. The scientific foundations of diets with its application are considered.

Keywords: blackberry, benefit, harm, beneficial properties, contraindications

Beneficial features

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

Main substances (g / 100 g):	Fresh Blackberry [1]
Water	88.15
Carbohydrates	9.61
Sugar	4.88
Alimentary fiber	5.3
Squirrels	1.39
Fats	0.49
Calories (kcal)	43
Minerals (mg/100 g):	
Potassium	162
Calcium	29
Phosphorus	22
Magnesium	twenty
Sodium	one
Manganese	0.646
Iron	0.62
Zinc	0.53
Copper	0.165
Vitamins (mg/100 g):	
Vitamin C	21
Vitamin E	1.17
Vitamin PP	0.646
Vitamin B6	0.03
Vitamin B2	0.026
Vitamin B1	0.02

A study of the composition of blackberries shows that the berries contain quite a lot of vitamins E, K and C - about 15%, 17% and 25% of the recommended daily requirement (RDI), respectively. In particular, vitamin K, which promotes blood clotting and strengthens bones, in one 100-gram serving of raw blackberries contains an average of 19.8 micrograms.

The mineral composition of blackberries is widely represented. Magnesium (5-7% RDI), potassium (5-8% RDI) and especially manganese (30-40% RDI) are found in relatively high concentrations in the berries, which helps prevent osteoporosis, control blood sugar levels, and reduce epileptic manifestations. In addition, one of the enzymes found in blackberries helps manganese form collagen and heal wounds.

Laboratory analysis shows that the fruits also contain malic, tartaric, citric, salicylic acids, and the seeds contain about 9-12% fatty oils.

Medicinal properties

The ink-black color of blackberries is due to anthocyanins - polyphenols. They help keep blood vessels healthy, protect cells from mutation and cancer, and the antioxidant properties of plant compounds can reduce the risk of certain chronic conditions, including diabetes.

Blackberry extracts also exert antimutagenic effects in vitro (in vitro, out of a living organism) and in vivo (inside a living organism) by altering cell signaling pathways and inhibiting tumor stimulating factors.

In support of this, scientists evaluated berry extracts for their ability to inhibit the growth of a number of human cancer cells: oral adenosquamous carcinoma (CAL-27), breast (MCF-7), colon (HT-29, HCT116), and tumor cell lines. prostate cells (LNCaP) at concentrations of 25 to 200 µg/ml. The researchers confirmed that with increasing concentration of the berry extract, there was an increase in inhibition of cell proliferation in all cell lines with varying degrees of activity between cell lines. ^[2]

Blackberry phenolic compounds have a protective effect on brain cells, preventing age-related neurodegenerative diseases ^[3], cognitive and motor problems caused by aging. Barbara Schuckitt-Hale, Ph.D. from the Tufts HNRCA Neuroscience and Aging Laboratory, who is experimenting with the polyphenols of various berries, also tested 2% blackberry extracts to test the effectiveness of this diet in combating age-related changes in laboratory animals. The results showed that the blackberry diet improved motor performance on balance, coordination, and memory tasks. Animals fed blackberries showed better short-term memory and greater performance.

Blackberry extracts help reduce the chance of blood clots. The antithrombotic effects found in laboratory experiments were associated with the regulation of the active substance of the vascular endothelium, activation of blood flow and a decrease in blood clotting (anticoagulant effect). ^[four]

There is also evidence that adding blackberries to your diet every day can reduce the number of visits to the dentist. A 2013 study showed ^[5] that blackberry extract has antibacterial and anti-inflammatory properties against certain types of bacteria that cause oral diseases. The researchers warn that more research is needed, but suggest that blackberry extract may help prevent cavities and control gum disease.

In addition to antimicrobial properties, the antidiabetic and anti-inflammatory properties of blackberry phenolic compounds require further study. It is also necessary to establish the exact physiologically effective concentrations of blackberry phenolic compounds in vivo. However, it is already clear that the therapeutic potential of blackberry concentrates is very high.

The possibilities of blackberry extracts are also highly appreciated in therapeutic programs aimed at stopping hair loss and activating the growth of hair follicles. Moreover, positive results are demonstrated by extracts of various parts of the plant: fruits, seeds, flowers, roots, although the most pronounced effect is achieved with blackberry leaf extracts.

In animal experiments, preparations containing plant extract at a concentration of 90-300 mg / ml, after application for 5-7 days, begin to stimulate the development of hair in the selected area. It is important that noticeable changes were recorded both in the phase of hair follicle regression (telogen) and in the phase of active hair growth (anagen).

Use in medicine

In official scientific medicine, blackberry preparations are not yet used, but extracts of the berries of this plant are widely represented in the dietary supplement industry. For example, blackberry CO₂ extract is positioned by manufacturers as a remedy for diarrhea and gastritis, tonsillitis and pharyngitis, hysteria and insomnia, as well as for the treatment of various skin pathologies.

Cosmetic brands produce berry extract to combat rosacea as a remedy that, when applied externally, can strengthen the walls of blood vessels, improve microcirculation and eliminate skin redness.

Blackberry leaves can also be purchased pre-packaged as an herbal supplement or tea substitute. The product description lists the bactericidal, anti-inflammatory, antipyretic, sedative and restorative properties of the plant.

In folk medicine

In folk medicine, blackberries are famous for their anti-inflammatory, antibacterial, tonic, blood-purifying and wound-healing properties. Due to the sedative effect that is found when eating berries, blackberries are often recommended for use in disorders of the nervous system (hysterical and pre-hysterical states, neuroses). But in general, this plant is considered as a universal remedy for internal and external use.

The fruits and leaves of blackberries in folk medicine have long been in demand as a therapeutic agent for normalizing the state of the gastrointestinal tract:

- relief from stomach pain,
- improve intestinal motility,
- stop bloody diarrhea and stomach bleeding,
- treatment of inflammatory diseases of the stomach and small intestine (gastroenteritis).

For enteritis, diarrhea, gastritis and gastric bleeding, crushed leaves (1 tablespoon) were poured with boiling water (250 ml) and infused for about 3 hours. The therapeutic effect was achieved with a 3-time intake of the drug in a volume of 100-150 ml before meals. Bleeding was also stopped with a decoction of blackberry roots in the ratio of 100 g of raw material to 500 ml of water. This mixture was first evaporated by half, and after straining, about 250 ml of infused red wine was added to it.

Ukrainian herbalists in the treatment of chronic enteritis prescribed the use of steam from the leaves and flowers of calendula in a ratio of 2: 1 - this remedy was taken three times a day for a teaspoon. Bulgarian folk healers decoction of leaves (up to 20 g of raw materials per 1 liter of water) was prescribed for gastritis, ulcers, diarrhea.

Blackberries in folk medicine are still used today to restore the functioning of the gastrointestinal tract, but unripe berries are recommended for a fixing effect in diarrhea, and overripe ones, on the contrary, as a laxative for constipation.

In addition to gastrointestinal pathologies, blackberries are included in therapeutic programs for:

- colds, sore throats, chronic coughs (gargle with a mixture of leaf decoction and fruit juice in a ratio of 4: 1, and drink blackberry leaf tea as a diaphoretic),
- kidney and liver diseases,
- bleeding and inflammation of the gums (in a mixture of infusions of St. John's wort and blackberry leaves),
- female diseases, accompanied by menstrual irregularities (using an infusion of blackberry leaves in the form of douching), with chronic inflammation of the vagina, whites,

- physiological sexual dysfunction in men.

Blackberries in folk medicine are also treated for dropsy. Moreover, as a urine and diaphoretic, modern healers less often use infusions of dried blackberries and more often - decoctions and infusions of the leaves or roots of the plant. To do this, crushed blackberry root (15 g) is poured with boiling water (300 ml) for 15-20 minutes and then taken 1 tbsp. l. every two hours.

Outwardly, in the form of leaf compresses, blackberry remedies are used to heal purulent wounds, eczema, chronic trophic ulcers, remove lichen and eliminate bacterial skin infections.

Ripe blackberries and young leaves are harvested for the preparation of medicines throughout the summer. Dry the leaves in shady ventilated rooms or in ovens at a temperature not exceeding 50 ° C. At the same time, the leaves should retain their natural color even after drying.

There is another way to prepare blackberry leaves for medicinal teas:

1. First, fresh leaves are left in a closed jar until they wither.
2. Then the leaves are kept under steam for several minutes until they turn black.
3. The resulting hardwood blanks are dried in air.

Such a blackberry leaf is stored in the same way as classic tea leaves - in a closed glass container.

In scientific research

Blackberry in recent years has increasingly become the object of scientific study. Scientists are also interested in the opportunity to use the potential of berries in medicine, and progressive ways to protect plants and crops, and new formats for using blackberries in the food industry. In the last year alone, dozens of works have appeared in which the central place is occupied by blackberries or extracts derived from them. As an example, here is a list of just five recent works of 2019 related to the healing effects of blackberries:

- *"Antioxidant potential and phenolic profile of blackberry anthocyanin extract followed by human gut microbiota fermentation"*. In this study, the scientists showed that blackberry anthocyanins, under the influence of intestinal microbiota enzymes, are able to form active metabolites with potential antioxidant activity against oxidative stress. ^[6]
- *"Effect of blackberry (*Rubus fruticosus* L.) juice on anxiety behavior in rats"*. As a result of experiments with different dosages of juice, and observations of animals under conditions of acute stress, scientists concluded that blackberry juice has a potential therapeutic effect on anxiety associated with a stressful event. ^[7]
- *"Blackberry extract inhibits telomerase activity in human rectal cancer cells"*. In this study, the antibodymerase activity of crude blackberry extract was analyzed in six human colorectal cancer (CRC) cell lines by TRAP assay. The scientists noted that blackberry extract significantly inhibited the growth of six CRC cell lines in a dose-dependent manner and concluded that telomerase inhibition is a key mechanism by which blackberry exerts its anti-cancer effect on CRC cells. ^[eight]
- *"A blend of blackberry leaf and fruit extracts alleviates non-alcoholic fatty liver disease (steatosis), improves gut integrity, and increases beneficial *Lactobacillus* and *Akkermansia* bacteria in rats."* In the experiment, rats with artificially induced steatosis were fed 50% ethanolic extracts of blackberry fruits or leaves (450 mg/kg body weight) for 12 weeks. As a result, scientists concluded that blackberry extract reduces the level of triglycerides and lipid peroxides in the liver, increases the number of genes associated with beta-oxidation, and reduces the number of those genes that are involved in the biosynthesis of fatty acids. In

addition, blackberry extract will also alleviate intestinal dysbiosis by increasing the amount of Lactobacillus and Akkermansia in the stool. ^[9]

Weight regulation

Blackberries, like some other anthocyanin-rich berries, prevent weight gain in laboratory rodent models of obesity. However, this does not mean that people will experience the same effect when eating berries. Therefore, the researchers set out to evaluate the effect of blackberry consumption on energy substrate utilization and glucoregulation in human volunteers on a high-fat diet.

27 overweight or obese men were included in a randomized, placebo-controlled, two-stage crossover study. ^[ten]

The diet followed by the volunteers contained 600 g of blackberries per day, introduced into the diet in a complex enough program to allow a comprehensive analysis of the effect of berries on obesity rates. Measurements of various markers indicated that blackberry consumption may promote increased fat oxidation and increased insulin sensitivity in overweight men.

Blackberries with their 43 kcal/100 g are indeed often included in healthy diet programs aimed at weight loss. This berry is quite low - up to 25 units. - glycemic index (GI), - which allows even diabetics to use it in their nutrition plans. Moreover, according to a more progressive system for assessing the effect of a product on blood sugar levels, indicating not only the quantity, but also the quality of carbohydrates - Glycemic Load (GL) - blackberries gain only 4 units, which is also very small.

In cooking

Blackberries have a sweet and sour taste, but the sourness in the berries is more pronounced. A tarry flavor may also be perceived, although the exact combination of flavors varies greatly depending on plant species, cultivar, and growing conditions. Creeping varieties of blackberries are considered sweeter. More sour and spicy - upright plant varieties.

Blackberries are eaten both raw and processed. Berries are used to make jam, marmalade, filling or decoration for baking (puddings, cakes, pies). Blackberries are often added to fruit salads, mixed with milkshakes.

The preparation of blackberry wine has recently become a separate and very popular culinary trend. Moreover, it is produced both industrially and at home. To create wine at home, you need 1 kg of blackberries, 1 liter of water, 250-300 g of sugar and 3-4 g of yeast.

1. Ripe berries are pre-peeled from the stalks, put in a glass jar and poured with water heated to a boil.
2. Blackberries are infused for 4-5 days in a dark, warm place.
3. At the end of the period, the infusion is filtered through gauze to separate the berries from the juice mixed with water.
4. The liquid (juice + water) is poured into a clean glass jar, where sugar and yeast are added.
5. In a dark place at room temperature, the mixture is aged for about a month until fermentation is completed.
6. After that, the wine is bottled, tightly corked and infused for about 4 more months until fully ripened in a dark, but already cool room.

In cosmetology

Among the most common cosmetic effects of blackberries when applied externally are the ability of various parts of the plant to:

- fight skin inflammation
- reduce sebum production
- soften the epidermis, providing conditions for regeneration,
- nourish and moisturize the upper layers of the skin.

Berry extracts are positioned by manufacturers as an effective vasoconstrictor to improve microcirculation and get rid of rosacea. Blackberry seed oil is widely represented in natural cosmetics as an antioxidant that inhibits the destructive processes of oxidation, due to which it is included in the composition of anti-aging creams and masks, therapeutic preparations for problem skin, ulcer and wound healing agents.

Dangerous properties of blackberries and contraindications

Blackberries have few contraindications. But with increased acidity of gastric juice, the use of these berries and juice should be limited. In addition, blackberries can potentially harm allergy sufferers by causing skin rashes, swelling, diarrhea, or vomiting.

In the list of products containing oxalates (salts and esters of oxalic acid), blackberries are included in the "red zone", which includes those berries that it is desirable to exclude from the diet to reduce the likelihood of exacerbation of urolithiasis, rheumatoid arthritis, and gout. However, blackberries cannot be called the record holder for the "oxalate" indicator, therefore, in the absence of obvious contraindications, the fruits of this plant can be eaten in moderation (about ½ cup per day).

Selection and storage

When choosing a blackberry, black and dry berries should be preferred. If you come across a wet blackberry covered with its own juice, then this means that it has been lying on the counter for at least three days and, most likely, has begun to deteriorate. An indirect sign of a spoiled product may be the presence of a swarm of flies near the tray. But the sour smell of spoiling berries, if you sniff, can be caught on your own.

Usually blackberries are sold without stalks, but if you come across a berry with "tails", then it's better not to take one, since it is likely that the crop was harvested too early and it will no longer be able to ripen at home "on the windowsill".

It is better to wash blackberries immediately before eating. In addition, to rid the fruits of natural moisture, they can be laid out on a paper towel in one layer.

When buying blackberries, keep in mind that fresh berries do not store for a long time. Even in the refrigerator they should not be kept for more than 3-4 days. The exception is low temperatures close to 0°C, at which the berry can lie for almost a week, as well as temperatures below zero, which allow the berries to be frozen until the next season. In order to easily extract the right amount of blackberries from the freezer later, it is advisable to freeze the berries on a baking sheet or cutting board laid out in one layer, and when they are frozen, pour them into a common container.

Also, for long-term storage, blackberries can be dried. In the traditional way, such drying is carried out under the sun or on special dryers heated by fire at a temperature of about 60 ° C. Similarly, blackberries can also be dried in ovens with the door slightly ajar to allow evaporating moisture to escape. Store dried fruits in paper bags or cardboard boxes.

Varieties and cultivation

As a fruit plant, blackberries have been cultivated only since the end of the 18th century. In Mexico, the USA, Serbia, Hungary, England, Romania, Poland, Croatia, Germany and some other countries, it is grown on an industrial scale, but the number of blackberry-producing countries has recently been growing.

Today there are many species, varieties and hybrids of blackberries. Breeders have also bred thornless varieties of blackberries, which bear fruit even more actively than thorny varieties, however, as a rule, they tolerate frosts worse.

One of the most popular varieties of thornless blackberries, Thornfree, is valued precisely for its ability to withstand temperatures down to -20°C. In this variety, up to 20-30 fruits grow on each brush, so that it is possible to collect up to 30 kg of berries from one bush.

In the United States, Marionberry berries are very popular, a blackberry variety (a cross between Chehalem and Olallie varieties), developed as part of a joint breeding program between the US Department of Agriculture and the University of Oregon.

Blackberry and raspberry hybrids are also widespread. So, back in 1883, lawyer James Harvey Logan accidentally crossed Texas Early blackberries and Red Antwerp raspberries on his plot, resulting in a product that was later named after him Logan berry. Another common hybrid was the Boysenberry (Ezhemalina, bred in 1923 by Rudolf Boysen). Sweet taste, pronounced blackberry-raspberry aroma and rich dark cherry color of large (average 8.5 g) fruits ensured high consumer demand for them.

In our country, preference is more often given to such varieties of kumanika (upright form) as "Ruben", "Ouachita", "Apache". Among the dewdrops (creeping forms), "Abundant", "Lucretia", "Oregon Thornless" are popular. But in general, from several hundred options for erect, creeping and transitional plant forms, each gardener can choose the most suitable ones.

When growing, after choosing the type and variety of blackberries, it is necessary to allocate a sunny area closed from the wind from the south or southwest side in the garden. At the same time, by the time the fruits appear next year, it will be necessary to consider the possibility of shading the bushes, since the bright sun can burn the berries and spoil their appearance. Blackberries are planted in April-May in well-drained light soil saturated with humus with an optimal pH of 6.

In general, it is considered that it is not difficult to grow blackberries on the site. Previously, gardeners often did this not so much for the sake of the harvest, but to create a decorative and at the same time irresistible hedge. However, now, with the spread of information about the medicinal, nutritional and cosmetic properties of blackberries, people have begun to appreciate the beneficial fruits of this still underestimated plant.

What is the difference between blackberries and black raspberries?

Despite the growing popularity of blackberries, for many people it is still an unfamiliar berry, although more experienced consumers can easily confuse blackberries with black raspberries that look very similar to them.

Black raspberries are a special variety of the more common red raspberries native to North America. Most commercially produced black raspberries are located in the northwestern United States, near the Pacific coast. This plant prefers cooler climates and is not as common as the blackberry. In addition,

black raspberries are harvested once a year - in July, which also distinguishes them from blackberries, which are available several months a year.

It is believed that it is even more difficult to distinguish blackberries from black raspberries on a bush than when assembled. And the thorny stems of the plant do not help with this, since different types of blackberries can be with more or less thorns. But after harvesting, the difference between the fruits is more noticeable:

- At the junction of the berry with the stalk, black (as well as red) raspberries will have a cavity. It appears because the core of the fruit (fruit bed) remains on the plant part. But the fruits of the blackberry are completely separated from the stalk, keeping inside the white or greenish fruit, with the help of which the berries were attached to the "tail".
- Both black raspberries and blackberries are soft to the touch when ripe and do not store for a long time. However, black raspberries are even softer and spoil even faster than blackberries.
- The fruits of both plants, at first glance, seem smooth, but if they are placed side by side, then, unlike blackberries, which are really absolutely smooth, a barely noticeable white pile can be seen on black raspberries.
- When comparing tastes, blackberries will be distinguished by a slight astringency, and black raspberries by a pronounced sweetness of the fruit.

In language:

- By the typical name of the blackberry, you can understand what form of the bush we are talking about: an upright plant is called a kumanika, and a creeping plant on the ground is called a dewdrop.
- The Russian name "blackberry" was apparently due to its "hedgehog" thorns on the branches. In related languages and regional dialects, it is called *ozhina*, *azhina*, *syrbalina*, *chill*, *deaf raspberry*, *turquoise* (probably for the bluish tint of the fruit).
- The very name "berry" in relation to blackberries is botanically incorrect. It is more correct to call the fruit of this plant a polydrupe, since it consists of many fruitlets with a stone (drupes) fused together.

In myths and beliefs:

- Celtic mythology ascribes to the blackberry the ability to communicate with the fairies.
- In England, superstitious locals try not to pick blackberries after October 11, because, according to legend, on this day the devil spits on blackberries, and the person who eats them will be cursed or defiled.
- But the fruits collected before September 29 could be used in rituals to add wealth. To do this, the blackberry was placed on the altar and a spell was pronounced, after which the well-being should have grown with the same activity as the thickets of the plant.
- The impenetrable thorny thickets served another purpose in the mythical rites: blackberry bushes planted along the edge of the forest were supposed to protect the villagers from forest spirits.
- Some peoples have a ritual of getting rid of rheumatism, according to which, on a sunny day, a sick person must crawl three times under thorny blackberry bushes, first with his back from west to east, and then face forward - from east to west.

The fashion for blackberry gardening in Western Europe, which peaked in the 60-80s. XX century, led to the fact that thorny bushes began to spread uncontrollably throughout the territories of cities. This, among other things, was facilitated by birds, which, together with the fruits of the plant that they loved, spread the seeds. As a result, now on the outskirts, wastelands and industrial areas of large

European cities, one can find large-scale impenetrable blackberry "wilds", which is sometimes used by beekeepers, since light and tasty honey is obtained from blackberry nectar.

Literature

1. US National Nutrient Database, [source](#)
2. Seeram NP, Adams LS, Zhang Y, Lee R, Sand D, Scheuller HS, Heber D. Blackberry, black raspberry, blueberry, cranberry, red raspberry, and strawberry extracts inhibit growth and stimulate apoptosis of human cancer cells in vitro. J Agric Food Chem. 2006 Dec 13;54(25):9329-39. doi:10.1021/jf061750g.
3. Lydia Kaume, Luke R Howard, Latha Devareddy. The blackberry fruit: a review on its composition and chemistry, metabolism and bioavailability, and health benefits. J Agric Food Chem. 2012 Jun 13;60(23):5716-27. doi:10.1021/jf203318p.
4. Xie P, Zhang Y, Wang X, Wei J, Kang W. Antithrombotic effect and mechanism of Rubus spp. blackberry. food funct. 2017 May 24;8(5):2000-2012. doi: 10.1039/c6fo01717g.
5. OA González, C Escamilla, RJ Danaher, J Dai, JL Ebersole, RJ Mumper, CS Miller. Antibacterial Effects of Blackberry Extract Target Periodontopathogens. J Periodontal Res. 2013 Feb;48(1):80-6. doi: 10.1111/j.1600-0765.2012. 01506.x.
6. Gowd V, Bao T, Chen W. Antioxidant potential and phenolic profile of blackberry anthocyanin extract followed by human gut microbiota fermentation. Food Res Int. 2019 Jun;120: 523-533. doi: 10.1016/j.foodres.2018.11.001. Epub 2018 Nov 2.
7. Fernández-Demeneghi R, Rodríguez-Landa JF, Guzmán-Gerónimo RI, Acosta-Mesa HG, Meza-Alvarado E, Vargas-Moreno I, Herrera-Meza S. Effect of blackberry juice (Rubus fruticosus L.) on anxiety-like behavior in Wistar rats. Int J Food Sci Nutr. 2019 Nov;70(7):856-867. doi: 10.1080/09637486.2019.1580680.
8. Tatar M, Bagheri Z, Varedi M, Naghibalhossaini F. Blackberry Extract Inhibits Telomerase Activity in Human Colorectal Cancer Cells. Nutr Cancer. 2019;71(3):461-471. doi:10.1080/01635581.2018.1506491.
9. Park S, Cho SM, Jin BR, Yang HJ, Yi QJ. Mixture of blackberry leaf and fruit extracts alleviates non-alcoholic steatosis, enhances intestinal integrity, and increases Lactobacillus and Akkermansia in rats. Exp Biol Med (Maywood). 2019 Dec;244(18):1629-1641. doi: 10.1177/1535370219889319.
10. Solverson PM, Rumpler WV, Leger JL, Redan BW, Ferruzzi MG, Baer DJ, Castonguay TW, Novotny JA. Blackberry Feeding Increases Fat Oxidation and Improves Insulin Sensitivity in Overweight and Obese Males. Nutrients. 2018 Aug 9;10(8):1048. doi: 10.3390/nu10081048.

[An extended HTML version of this article](#) is available on the edaplust.info website.

Blackberries - 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

Received 08/19/20

Abstract. The article discusses the main properties of blackberries and its effects 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 blackberries in various types of medicine and the effectiveness of its use in various diseases are considered. The potentially adverse effects of blackberries on the human body under certain medical conditions and diseases are analyzed separately. Considered scientific basics diets With her application.



Bulgarian pepper (Latin: *Cápsicum ánnuum*)

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

Alena Tarantul, nutritionist

Email: eliseeva.t@edaplust.info, tarantul.a@edaplust.info

Abstract. The article discusses the main properties of Bulgarian pepper 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 bell pepper in various types of medicine and the effectiveness of its use in various diseases are considered. The potentially adverse effects of bell pepper on the human body under certain medical conditions and diseases are analyzed separately. The scientific foundations of diets with its use are considered.

Key words: bell pepper, benefits, harm, beneficial properties, contraindications

Beneficial features

Table 1. Chemical composition of bell pepper (according to [Food+](#)).

Main substances (g / 100 g):	Fresh pepper [1]
Water	91.51
Carbohydrates	6.7
Sugar	3.53
Alimentary fiber	one
Squirrels	0.8
Fats	0.41
Calories (kcal)	29
Minerals (mg/100 g):	
Potassium	202
Phosphorus	29
Magnesium	16
Calcium	12
Sodium	one
Iron	0.46
Zinc	0.3

Manganese	0.204
Copper	0.115
Vitamins (mg/100 g):	
Vitamin C	92.9
Vitamin PP	1.092
Vitamin B6	0.517
Vitamin E	0.48
Vitamin B1	0.079
Vitamin B2	0.055

Fresh bell peppers are mostly (90-92%) water. The rest is carbohydrates, which account for most of its calories, and a small amount of proteins and fats. The carbohydrates here are the sugars that are responsible for the sweet taste of ripe peppers. The fruits of the plant contain a small amount of fiber - about 2% of the total weight.

Sweet pepper includes a complex of various vitamins and minerals with record levels in some positions. So, just one red bell pepper provides 150-170% of the recommended daily intake of vitamin C. But a number of other vitamins are also found in fruits:

- **pyridoxine** (the most common form of vitamin B6) important for the production of red blood cells,
- **phylloquinone** (one of the forms of vitamin K), which plays a significant role in blood clotting and bone strength,
- **vitamin E**, necessary for the functioning of the nervous and muscular systems,
- **vitamin B9**, which performs many tasks, and is of particular importance during pregnancy,
- **beta-carotene** of red sweet pepper (provitamin A), which is responsible for redox processes, metabolism, regulation of protein synthesis, cell membrane functionality.

However, bell peppers of different colors can vary significantly in nutritional and vitamin value. The degree of fruit ripening also plays a role - it is known that bell pepper is rich in various antioxidants, especially carotenoids, but they are much more in ripe specimens than in unripe ones. And the amount of vitamin A in red pepper is 7-8 times higher than its amount in green.

Finally, the way the pepper is grown is important. Polish researchers found that an organic growing system provides a level of bioactive compounds (carotenoids and polyphenols) such that organic bell peppers contain significantly more vitamin C, total carotenoids, β -carotene, α -carotene, cis- β -carotene, total phenolic acids and flavonoids compared to fruits grown in the traditional (inorganic) way. The level of antioxidant compounds in fruits is also affected by the plant variety. ^[2]

Of the active compounds found in bell pepper:

- **capsanthin**, the pigment that makes red peppers red, is considered a powerful antioxidant
- **Violaxanthin** is another carotenoid antioxidant found in abundance in yellow bell peppers.
- **zeaxanthin** - a pigment that gives pepper a yellow color, which, when ingested with food, works to restore visual function,
- **lutein** - a compound that can also improve eye health - it is present in unripe peppers, although it is practically absent in ripe fruits,
- **Quercetin** is a polyphenolic antioxidant that is useful in preventing chronic heart disease and cancer, etc.

Medicinal properties

Like most plant foods, bell peppers are considered a healthy food. Its regular use is associated with a reduced risk of developing various chronic diseases and pathologies.

- **Eye benefits.** The most common types of visual impairment are macular degeneration and cataracts, the main causes of which are considered to be aging and infections. But adding carotenoid-rich bell peppers (lutein and zeaxanthin) to your diet can improve eye health (when consumed in sufficient amounts). In fact, carotenoids protect the retina - the light-sensitive inner wall of the eye - from oxidative damage, preventing cataract formation and macular degeneration.
- **Prevention of anemia.** Anemia is a common disease characterized by a decrease in the ability of the blood to carry oxygen. One of the most common causes of anemia is iron deficiency, the noticeable symptoms of which are weakness and fatigue. Red bell pepper in the prevention of anemia is not only a source of iron (it contains about 4-5% of the recommended daily intake), but as a product exceptionally rich in ascorbic acid, which improves the absorption of iron from the intestines.
- **Slow down inflammatory processes.** In a study evaluating the anti-inflammatory effect of an aqueous extract of bell pepper leaves on mouse spleen cells, researchers found that the extract significantly suppressed inflammatory cytokine production and cell proliferation without causing cytotoxicity. It also suppressed the expression of inflammatory proteins, which made it possible to conclusion about the anti-inflammatory activity of the extract and its potential in possible therapeutic applications. ^[3]
- **mental health.** The high concentration of vitamin B6 in peppers increases the levels of the hormones serotonin and norepinephrine (sometimes referred to as “happiness hormones”) in the person who eats it. Higher levels of these hormones have been linked to improved mood, concentration, and energy levels, while lower levels have been linked to a number of psychiatric disorders. In addition, a lack of vitamin B6 contributes to memory impairment, reduces brain performance and can increase the risk of Alzheimer's disease, dementia.
- **Pregnancy control.** Sweet peppers contain about 15% of the recommended daily intake of folic acid that pregnant women need. In fact, the recommended daily intake of folic acid is increased by about 50% for pregnant women due to its role in preventing birth defects and keeping unborn children healthy.
- **The condition of the skin.** Sufficient provision of the body with ascorbic acid and carotenoids promotes the production of collagen and is good for the skin. In people who have enough ascorbic acid, the skin is less dry and wrinkled.
- **Reduced risk of cancer and heart disease.** Carotenoids in bell peppers are effective plant antioxidants that reduce the damage that oxidation causes to body cells. In particular, red varieties contain very high amounts of beta- and alpha-carotene, lutein and zeaxanthin.

One way to further boost the antioxidant power of bell peppers is to steam them. Research has shown that this cooking method improves the ability to bind bile acids. This means that in the process of digestion of food, cholesterol is used more efficiently and the absorption of fat is reduced, and, as a result, the likelihood of problems with blood vessels decreases. ^[four]

However, in various epidemiological studies, which consistently find a positive association of regular consumption of fruits and vegetables with a reduction in the risk of developing chronic diseases, they also say that the effect of any one particular phytonutrient in itself does not explain the observed benefit. Only in a combination of compounds can a stable therapeutic effect be obtained. For example, in one study, synergistic growth inhibition of prostate and breast cancer cells only became apparent when using combinations of low concentrations of various carotenoids (or carotenoids with retinoic acid and an active vitamin D metabolite). ^[5] And Bulgarian pepper is just famous for a special combination of medicinal components that show pronounced benefits in combination with each other.

In medicine

In official medicine, sweet pepper was used as a component of a therapeutic diet. In particular, **table No. 5** (according to Pevzner) with the optimal proportion of carbohydrates, proteins and fats, recommended for chronic hepatitis, cholecystitis, cholelithiasis and other pathologies of the liver and gallbladder, suggested the use of a limited amount of bell pepper. And although in Russia, since 2003, M. Pevzner's tables have not been used in medical institutions, instead of them, an alternative non-numbered diet system has been introduced in hospitals.

In addition, on sale among dietary supplements, you can relatively inexpensively find oil extracts of sweet pepper containing carotenoids in a concentrated form. This extract is recommended by the manufacturer for the treatment of hypertension.

In folk medicine

In folk medicine, remedies based on hot pepper are much more common, but people have also found use for sweet bell pepper;

- **Fruit.** Sweet pepper in folk medicine treat cardiovascular diseases, anemia, scurvy, diabetes and osteoporosis, sciatica, arthritis, asthma. With its help, they improve digestion, normalize sleep, relieve depression, restore strength and cognitive functions.
- **Juice.** Sweet pepper juice is recommended to drink every day to lower blood pressure. They usually start drinking it with small doses (30-50 ml per day), gradually increasing the volume to 100 ml.
- **Seeds.** Some authors call sweet pepper seeds and whitish pulp near the stalk the most useful part of the fruit because of the high concentration of vitamins in them. These seeds are used to treat asthma, diseases of the heart, blood vessels, liver, they are also used to prevent cancer as a product with a high content of vitamins C and A. To do this, the seeds are first dried and ground into a powder, which is then added to food like a vitamin seasoning.

In folk medicine, there is a division according to the degree of usefulness of fruits of different colors.

- **Red pepper.** It is believed that it has the widest spectrum of therapeutic action. It is recommended to be introduced into the daily diet to protect cells from oxidative stress, prevent problems with the heart, pancreas, prostate and ovaries. As a rich source of vitamins P, C, red sweet pepper carotene can reduce the risk of stroke and overcome the consequences of cerebrovascular accident. It is also used to relieve the symptoms of bronchopulmonary diseases. With its help, they fight stress and normalize sleep.
- **Yellow pepper.** With its help, in home medicine, they regulate the functionality of the thyroid gland, restore the working capacity of the nervous system, treat the heart and musculoskeletal system. It is also referred to as a product that can remove uric acid and thereby alleviate the condition of patients with arthritis and gout.
- **Green pepper.** Chlorophyll of green fruits helps to saturate the blood with oxygen and, by improving nitrogen metabolism, remove toxins from the body, and the presence of coumaric and chlorogenic acids in them gives reason to use such a product in the prevention of cancer.

In addition, traditional healers recommend eating bell pepper regularly to improve the condition of the skin, hair, bones, teeth and gums. It is believed that rinsing the mouth with freshly squeezed bell pepper juice will help get rid of inflammation of the oral mucosa.

In scientific research

All studies of sweet bell pepper can be divided into several thematic groups. The most numerous of them will be a group of works in which scientists are trying to establish ways to improve the consumer qualities of grown vegetables, reduce the risk of plant infection with diseases, and provide more efficient and cheaper ways to store crops. Among the recent (2015-2020) studies, examples include works with the following headings:

- "Quantitative Trait Loci (QTL) Controlling Fruit Size and Other Horticultural Features of Bell Peppers". ^[6]
- "Polyphenols and carotenoids in organic and traditional pickled bell peppers". ^[7]
- "Uptake and distribution of fluopyram and tebuconazole fungicide residues in tomato and bell pepper plant tissues". ^[eight]
- "A chill tolerant cultivar of bell pepper increases nitrogen excretion and induces stress accumulation of metabolites in roots in response to low root zone temperatures." ^[9]
- "Analysis of coding and non-coding RNA transcriptomes in response to chilled bell peppers". ^[ten]

But there is also a smaller group of research projects in which scientists study the mechanisms and extent of the therapeutic effect of sweet bell pepper on the body. Here are some examples of such studies:

"Allergy to bell pepper: different profiles of sensitization" ^[11]

In their work, scientists consider different options for the appearance and increase in human sensitivity to the effects of irritants - compounds present in bell peppers - and the mechanisms for the appearance of an allergic reaction to the product.

"The short-term effect of bell pepper juice supplementation with an integrated yoga therapy approach on blood glucose levels and cardiovascular function in patients with type 2 diabetes mellitus: a randomized controlled trial". ^[12]

Here, researchers approached the study of the effect of sweet pepper on the condition of patients with type 2 diabetes in an unconventional way, combining the therapeutic effects of yoga and a dietary supplement. The experiment involved 50 patients aged 34 to 69 years who were randomly divided into study and control groups. The study group received 100 ml of bell pepper juice (twice a day) along with yoga therapy, while the control group received only yoga therapy for 4 consecutive days.

The results of the work showed that although the addition of 100 ml of bell pepper juice twice a day along with yoga therapy was not more effective in lowering fasting blood glucose levels, but after eating in the study group, there was a significant decrease in blood glucose levels, systolic arterial pressure, pulse pressure, velocity pressure product.

"Sweet pepper inhibits β -secretase activity and β -amyloid aggregation". ^[13]

In this project, scientists are looking at the problem of amyloid protein deposition in the form of senile plaques, which is considered the main hallmark of Alzheimer's disease. It is formed as a result of sequential cleavage of the amyloid precursor protein by secretases. The scientists decided to test how the effects of polyphenols (which are rich in extracts of ripe and unripe bell peppers) would affect amyloid production and protein aggregation in an in vitro experiment ("in vitro").

As a result, the investigators concluded that ripe pepper fruits had a dose-dependent inhibition of β -secretase ($2.17 \pm 0.17 \mu\text{g/L}$), demonstrating a significantly ($P < 0.05$) higher inhibitory effect than unripe ones ($3.44 \pm 0.11 \mu\text{g/L}$). In addition, thioflavin-T analysis and transmission electron

microscopy showed that pepper fruit phenolic extracts (1 and 10 µg/L) could counteract the initial aggregation of Aβ1-40 as well as prevent further aggregation of preformed fibrils.

Summarizing the above, the researchers suggested that sweet bell pepper may be a useful dietary supplement in the treatment of Alzheimer's disease.

Weight regulation

Unlike spicy representatives of the genus, bell peppers do not contain hot capsaicin, which, among other things, controls the metabolic syndrome and related disorders (obesity, lipid profile disorders, etc.). But bell pepper also helps those who lose weight control body weight.

This product has very few calories (from 20 to 32 kcal / 100 g) and a lot of vitamins, which makes it possible to build fasting days and diets on its basis. But mono-diets on bell pepper are not shown to everyone. It is better to choose a different diet for problems with the liver and kidneys, ulcers, gastritis with high acidity. Also, before choosing a pepper diet, it is better to consult a nutritionist for hypertensive patients and people with coronary heart disease.

Below is an example of a 2-week weight loss diet based on a US study of 25 weight loss volunteers:

- **1 day.** The entire diet consists of raw vegetables, the total weight of which should not exceed 1 kg. At the same time, at least 50% of the vegetable set should be bell pepper.
- **Day 2** Vegetables of the “first day” are replaced with fruits (too sweet grapes and bananas are excluded).
- **3-4 days.** Pepper (300 g), fruit (300 g), boiled egg (1 pc.).
- **5-7 days.** Pepper (300 g), boiled meat (200 g), cottage cheese (200 g), unsweetened drinking yogurt.

The second week almost duplicates the first, but on the 13th-14th day you can take the menu of any other day.

In cooking

Bell peppers can be eaten raw or cooked. Like its related chili pepper, sweet varieties are sometimes dried and ground. Such a powdered spice of non-burning varieties is called paprika. Although in Hungarian culinary practice, where paprika is especially widespread, there is also a spicy scalding paprika, which includes pepper seeds containing hot capsaicin. All types of paprika are added to dishes to give them varying degrees of spice and special flavors. In addition, paprika is often used as a dye in the manufacture of sausages and other meat products.

Peppers of any color are used for food, but when choosing fruits, one should take into account that green (unripe) and purple vegetables have a slightly bitter taste, and red, orange and yellow have sweeter, almost fruity “notes”.

Sweet peppers perfectly complement fried meat dishes, go well with stewed pork and chicken. In real French ratatouille, Hungarian and Bulgarian lecho, Hungarian goulash and paprikash, Turkish gouveche, sweet pepper is one of the important ingredients. Especially expressive aroma and taste are acquired by fruits baked in the oven or on a charcoal grill. Fresh and pickled peppers coexist harmoniously with scrambled eggs and scrambled eggs.

One of the oldest and most popular bell pepper recipes, first discovered in a Boston cookbook in 1896, is stuffed peppers:

Recipe I

- 6 green peppers.
- 3/4 cup hot parboiled rice.
- 1/2 cup cold meat, cut into small cubes
- 1/3 cup stewed and mashed tomatoes.
- 1 tablespoon melted butter.
- A few drops of onion juice.
- Salt and pepper.

Cut pieces off the ends of the pepper stalks. Remove seeds and partitions; steam 8 minutes. Fill with rice, meat, tomatoes and butter, mix well and season with onion juice, salt and pepper. Pour into a skillet, add one and a half cups of water or broth and bake for forty-five minutes in a moderate pressure oven.

Recipe II.

Prepare peppers in the same way as stuffed peppers I. Fill with equal parts finely chopped cold fried chicken or veal and softened breadcrumbs seasoned with onion juice, salt and pepper. ^[fourteen]

Despite the considerable age of the collection, this is not the earliest mention of the dish known to us. Here, for example, is an even earlier pickled bell pepper recipe from Miss Parloa's New Cookbook of 1880:

“Take a big bell pepper. Cut off the stem, remove it and take out all the seeds. For the filling, use two liters of chopped cabbage, one cup of white mustard seeds, three tablespoons of celery seeds, two tablespoons of salt, half a cup of grated horseradish. Fill each pepper with some of this mixture, and put a small onion and some cucumber in each. Tie up the stem again, put the pepper in a jar and pour cold vinegar over it.” ^[fifteen]

In cosmetology

Regular consumption of bell pepper improves the condition of the skin and hair. But the main set of cosmetic procedures is associated with the external use of the fruits of the plant as part of anti-aging, whitening, toning, nourishing masks for the skin and lotions for hair shine.

Examples of home cosmetics with bell pepper for facial skin:

- **Rejuvenating mask.** Red (yellow) pepper is ground to a pulp and mixed with a beaten egg (1 pc.) And sour cream (1 tsp). This mass is applied to the face for a quarter of an hour, after which it is washed off with warm water.
- **Moisturizing mask.** Finely grated pitted pepper (1 pc.) Mixed with cabbage (1 tbsp.) And carrot juice (1 tbsp.). To keep this semi-liquid mixture on the skin, it is first distributed over gauze, which is then applied for 15-20 minutes in the face and neck. The rest of the mixture is washed off with water.
- **Whitening mask.** To get rid of age spots on the skin, previously lubricated with olive oil, simply apply red sweet pepper cut into strips. Twenty minutes later, the remnants of the mask are washed off with green tea.

Dangerous properties of bell pepper and contraindications

Bulgarian pepper is a generally safe product, but it sometimes causes an allergic reaction or intolerance. Among the symptoms of an allergic reaction to sweet peppers are abdominal pain, diarrhea, nausea, vomiting, skin rash, hives, itchy throat, swelling and difficulty breathing.

An allergy to bell pepper is evidence of an immune response to the proteins contained in it. Researchers at the Mayo Clinic have been studying this problem, and according to them, such a reaction to pepper may be correlated with the presence of an allergy to wormwood pollen: if a person has an allergic reaction to wormwood, this increases the likelihood of an allergy to bell peppers.

In addition, an earlier study published in November 2004 in the journal *Clinical & Experimental Allergy* ^[16] indicated that bell peppers should be included in the list of products of the so-called "latex-fruit syndrome": people who are allergic to latex are more degrees run the risk of getting allergic to bell pepper, although in practice such an immune response occurs quite rarely.

The second possible cause of stomach pain after eating bell pepper is food intolerance. (Although intolerance has common symptoms with allergies, it's not quite the same.) Usually, in the case of regular formation of gases, diarrhea and pain after eating pepper, patients are advised to pay attention to the dosage. According to the Cleveland Clinic, an eating disorder can occur after a large amount of eaten pepper and does not manifest itself after a small one.

Sometimes researchers attribute the resulting disorder to fructose hypersensitivity. Sometimes with food poisoning. Sometimes - with a fibrous structure of pepper and the presence of a fairly hard skin. Because of this, pepper is not recommended for people suffering from peptic ulcers and gastritis.

Often, experts warn about the likelihood of an increased concentration of pesticides in the fruits of sweet pepper. So, for example, in the "Dirty Dozen" (an annually updated list of products contaminated with pesticides, which is compiled by the Environmental Working Group - EWG), sweet peppers almost always make it. It often ends up at the bottom of the list, but the EWG warns that pesticides used to treat sweet bell peppers "tend to be more toxic to human health."

Selection and storage

When choosing sweet peppers, preference should be given to fruits that are firm to the touch, bright in color with glossy, dry and smooth skin without damaged areas (without dark putrefactive spots and cracks). On yellow peppers, red, green or orange spots are acceptable, on orange - red or yellow. Bright spotting, as a rule, will indicate incomplete ripening of the fruit, although such peppers can be bought.

The stalk from which the fruit is torn off should not be dried up or black. Its drying is a sign of long-term storage, and the moistness of the skin around the "tail" is a sign of the onset of decay.

Regardless of the degree of ripening, it is better to keep the pepper in the refrigerator, but at the same time, unripe fruits (in the stage of technical maturity) when stored for up to 2-3 months are first placed in a relatively warm compartment of the refrigerator (about + 10 ° C), and then, after acquiring the skin bright uniform color, they are moved to a cold compartment (0-1 °C).

Peppers already ripe at the time of purchase (in the stage of biological maturity) are placed in the cold compartment immediately. They are packed in plastic bags or stacked in trays lined with crumpled porous paper to absorb excess moisture and create air pockets that provide ventilation.

To preserve bell pepper until the next season, freeze in the freezer. To do this, the pepper is washed, the stalk and seeds are removed, and then dried well. You can freeze both whole cups, inserting them

into each other according to the “matryoshka” principle, and fruits cut into slices. But keep in mind that even when frozen, peppers gradually, albeit slowly, lose their flavor.

Varieties and cultivation

In the modern world, there are hundreds of multi-colored and various varieties of sweet pepper. It is quite difficult to choose from them the most productive large or tasty variety (hybrid), so we will show the “five”, in our opinion, unusual bell peppers that look different from the fruits we are used to.

- **F1 Snowwhite.** An early hybrid from the Hungarian Wax Pepper group. Weight can reach 165 grams. The fruit is sweet and juicy. But it attracts us, first of all, not by its taste, but by its color. At first, the fruits have a milky white color, and then, as they ripen, they become bright orange.
- **Ingrid.** A high-yielding variety with peppers weighing up to 230 grams, having fruits of an unusual shape and color. The color of Ingrid is most reminiscent of chocolate, and the shape is almost a regular cube.
- **Red miracle F1.** The fruits of this hybrid, 220-260 grams each, despite the telling name, by the end of ripening acquire not so much red as maroon color. But this pepper was also called a “miracle” because it has a rather rare, almost round shape with flattened “poles”.
- **Kolobok.** And here the name directly speaks of the shape of the pepper, which, due to its spherical shape, is very similar to a ripe red tomato. In addition, this variety has a good yield, resistance to diseases and pests.
- **Blot.** A purple variety of bell pepper with a high yield. He is not afraid of wilting caused by spores of the fungus *Verticillium albo-atrum*, which other varieties are afraid of, but he will not stand the lack of light.

Peppers can be grown not only in vegetable gardens and open plantations, but also at home. Especially for the decorative effect, small pepper trees or seeds are sold, from which you can grow a bush with many peppercorns on the branches. When transplanted into open ground, such a bush is easy to turn into a solid large plant, if you follow the general requirements for growing peppers.

Pepper is very picky about lighting. It does not tolerate shade during the entire period of its development. Needs nutritious soil. Purchased soil for begonias or violets is suitable for it, and if you prepare it yourself, a mixture of turf, sand and peat in a ratio of 1: 1: 2, respectively. The area of the root system of the plant is not very large, so clay pots about 18-20 cm in diameter can be used for planting at home. In addition, sweet peppers love warmth and do not like drafts. But in general, growing bell peppers is quite a feasible task even for a novice gardener.

Literature

1. US National Nutrient Database, [source](#)
2. Ewelina Hallmann, Ewa Rembiałkowska. Characterization of antioxidant compounds in sweet bell pepper (*Capsicum annuum* L.) under organic and conventional growing systems. *J Sci Food Agric.* 2012 Sep;92(12):2409-15. doi: 10.1002/jsfa.5624.
3. Mai Hazekawa, Yuko Hideshima, Kazuhiko Ono, Takuya Nishinakagawa, Tomoyo Kawakubo-Yasukochi, Tomoka Takatani-Nakase, Manabu Nakashima . Anti-inflammatory effects of water extract from bell pepper (*Capsicum annuum* L. var. *grossum*) leaves in vitro. *Exp Ther Med.* Nov 2017; 14(5): 4349–4355. Published online 2017 Sep 5. doi: 10.3892/etm.2017.5106.
4. Talwinder Singh Kahlon, Mei-Chen M Chiu, Mary H Chapman. Steam cooking significantly improves in vitro bile acid binding of collard greens, kale, mustard greens, broccoli, green bell pepper, and cabbage. *Nutr Res.* 2008 Jun;28(6):351-7. doi: 10.1016/j.nutres.2008.03.007.

5. Karin Linnewiel- Hermoni , Marina Khanin, Michael Danilenko, Gabriel Zango, Yaara Amosi, Joseph Levy, Yoav Sharoni. The anti-cancer effects of carotenoids and other phytonutrients resides in their combined activity. Arch Biochem Biophys. 2015 Apr 15;572: 28-35. doi: 10.1016/j.abb.2015.02.018. Epub 2015 Feb 21.
6. Chunthawodtiporn J, Hill T, Stoffel K, Van Deynze A. Quantitative Trait Loci Controlling Fruit Size and Other Horticultural Traits in Bell Pepper (*Capsicum annuum*). Iant Genome. 2018 Mar;11(1). doi: 10.3835/plantgenome2016.12.0125.
7. Hallmann E, Marszałek K, Lipowski J, Jasińska U, Kazimierzczak R, Średnicka-Tober D, Rembiałkowska E. Polyphenols and carotenoids in pickled bell pepper from organic and conventional production. food chem. 2019 Apr 25;278: 254-260. doi: 10.1016/j.foodchem.2018.11.052.
8. Matadha NY, Mohapatra S, Siddamallaiiah L, Udipi VR, Gadigeppa S, Raja DP. Uptake and distribution of fluopyram and tebuconazole residues in tomato and bell pepper plant tissues. Environ Sci Pollut Res Int. 2019 Feb;26(6):6077-6086. doi: 10.1007/s11356-018-04071-4.
9. Aidoo MK, Sherman T, Lazarovitch N, Fait A, Rachmilevitch S. A bell pepper cultivar tolerant to chilling enhanced nitrogen allocation and stress-related metabolite accumulation in the roots in response to low root-zone temperature. Physiol Plant. 2017 Oct;161(2):196-210. doi: 10.1111/ppl.12584.
10. Zuo J, Wang Y, Zhu B, Luo Y, Wang Q, Gao L. Analysis of the Coding and Non-Coding RNA Transcriptomes in Response to Bell Pepper Chilling. Int J Mol Sci. 2018 Jul 9;19(7):2001. doi: 10.3390/ijms19072001.
11. Callero A, Cabrera-Hernandez V, Perez-Rodríguez E, Jimeno-Nogales L, Martinez-Tadeo JA, Plata-Rodríguez E, Garcia-Robaina J. Bell Pepper Allergy: Different Sensitization Profiles. J Investig Allergol Clin Immunol. 2018 Oct;28(5):340-342. doi: 10.18176/jiaci.0278.
12. Nagasukeerthi P, Mooventhan A, Manjunath NK. Short-term effect of add on bell pepper (*Capsicum annuum* var. *grossum*) juice with integrated approach of yoga therapy on blood glucose levels and cardiovascular functions in patients with type 2 diabetes mellitus: A randomized controlled study. Complement Ther Med. 2017 Oct;34: 42-45. doi: 10.1016/j.ctim.2017.07.011.
13. Ogunraku OO, Oboh G, Passamonti S, Tramer F, Boligon AA. *Capsicum annuum* var. *grossum* (Bell Pepper) Inhibits β -Secretase Activity and β - Amyloid(1-40) Aggregation. J Med Food. 2017 Feb;20(2):124-130. doi: 10.1089/jmf.2016.0077.
14. Original Boston Cooking School Cook Book , Fannie Merritt Farmer, facsimile 1896 edition [Weathervane Books: New York] 1973 (p. 267-268).
15. Miss Parloa's New Cook Book, Maria Parloa [Estes and Luariat:Boston] 1880, 1886 (p. 344).
16. S Wagner, C Radauer, C Hafner, H Fuchs, E Jensen-Jarolim, B Wüthrich, O Scheiner, H Breiteneder. Characterization of cross-reactive bell pepper allergens involved in the latex-fruit syndrome. Clinic Exp Allergy. 2004 Nov;34(11):1739-46. doi: 10.1111/j.1365-2222.2004.02103.x.

[An extended HTML version of this article](#) is available on the edaplust.info website.

Bell pepper - useful properties, composition and contraindications

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

Alena Tarantul, nutritionist

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

Received 09/03/20

Abstract. The article discusses the main properties of Bulgarian pepper 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 bell pepper in various types of medicine and the effectiveness of its use in various diseases are considered. The potentially adverse effects of bell pepper on the human body under certain medical conditions and diseases are analyzed separately. Considered scientific basics diets With his application.



Potassium (K , potassium) - description, effect on the body, best sources

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

Mironenko Anastasia , nutritionist

Email: eliseeva.t@edaplust.info, myronenko.a@edaplust.info

Abstract. The article discusses the main properties of potassium (K) 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 potassium are indicated. The use of the mineral in various types of medicine and the effectiveness of its use in various diseases are considered. The potentially adverse effects of potassium on the human body under certain medical conditions and diseases are analyzed separately.

Key words: potassium, potassium, K , benefit, harm, useful properties, contraindications

Potassium (K) is an important dietary mineral and electrolyte. It is essential for the functioning of all living cells and therefore is present in all plant and animal tissues. Normal body function depends on the proper regulation of potassium concentrations both inside and outside the cells. This trace element plays an important role in the regulation of body electrical signals (maintenance of cell polarity, neuronal signaling, transmission of cardiac impulses and muscle contraction), in the transport of nutrients and metabolites, and in the activation of enzymes ^[1,2] .

Discovery history

As a mineral, potassium was first discovered in 1807 by the famous British chemist Humphrey Davy while creating a new type of battery. It was only in 1957 that an important step was taken in understanding the role of potassium in animal cells. The Danish chemist Jens Skou, who received the Nobel Prize in Chemistry in 1997, made a discovery in the process of exchange of potassium, sodium and magnesium ions in crab cells, which gave impetus to subsequent studies of the mineral in other living organisms ^[3] .

Foods rich in potassium

Both plant and animal products are excellent sources of potassium. Potassium-rich plant foods include avocados, raw spinach, bananas, oats, and rye flour. Relatively rich in potassium foods of animal origin - halibut, tuna, mackerel and salmon. Slightly less of the mineral is present in meats such as pork, beef, and chicken. White flour, eggs, cheese and rice contain very small amounts of potassium. Milk and orange juice are good sources of potassium, as we often consume large amounts of them ^[1].

Table 1. List of foods rich in potassium (according to [Food+](#)).

Product	Potassium content (mg/100 grams)
White beans	1795
Dried apricots	1162
pistachios	1025
Raisin	825
Flaxseeds	813
Pumpkin seeds	809
Almond	733
Prunes	732
chickpeas	718
Dark chocolate (85% cocoa)	715
Hazelnut	680
Oat bran	566
Spinach	558
Avocado	485
edamame beans	482
Potato	425
Bulgur	410
Sardines, cooked	397
Chard	379
Parsnip	375
Salmon	366
Banana	358
Butternut squash	352
curly cabbage	348
Sweet potato	337
Beet	325
Carrot	320
Buckwheat	320
Champignons	318
Mackerel	314
Melon	267
Tuna	252
polka dots	244
Pomegranate	236
Pork	185
Cucumber	147
Whole milk	132
Watermelon	112

Lean beef	96
shellfish	46

daily requirement

Since there is insufficient data to determine an estimated average requirement and therefore to calculate a recommended dietary allowance for potassium, an adequate intake has been developed instead. NAP for potassium is based on a diet that should support lower blood pressure, reduce the adverse effects of sodium chloride intake on blood pressure, reduce the risk of recurrent kidney stones, and possibly reduce bone loss. In healthy people, excess potassium above the NAP is excreted in the urine.

The Adequate Intake of Potassium (depending on age and gender):

Life period	Age	Men: (mg/day)	Women: (mg/day)
babies	0–6 months	400	400
babies	7–12 months	700	700
Children	1–3 years	3,000	3,000
Children	4–8 years	3,800	3,800
Children	9–13 years old	4,500	4,500
Teenagers	14–18 years old	4,700	4,700
adults	19 years and older	4,700	4,700
Pregnancy	14-50 years old	-	4,700
Breast-feeding	14-50 years old	-	5,100

Daily requirement increases:

- *in African Americans:* Because African Americans have a lower dietary potassium intake and are more likely to suffer from high blood pressure and salt sensitivity, this subpopulation especially needs to increase their potassium intake;
- *in patients with type 1 diabetes* or those taking non-steroidal anti-inflammatory drugs;
- *when playing sports:* potassium is intensively excreted from the body with sweat;
- *when taking diuretics* ;
- *with a low-carbohydrate and high-protein diet* : often with such a diet, fruits are not consumed, which contain alkalis necessary for potassium metabolism.

The daily requirement is reduced:

- in patients with chronic renal failure, end-stage kidney disease, heart failure;
- in pregnant women with preeclampsia, due to the risk of developing hyperkalemia with excessive intake of potassium in the body ^[4].

Useful properties of potassium and its effect on the body

Health Benefits of Potassium:

- Supports Brain Health

Potassium is very important for the health of the nervous system, which consists of the brain and spinal cord, as well as nerves. Potassium also plays a role in the osmotic balance between cells and interstitial fluid. This means that with a lack of potassium, the exchange of fluids in the body is disturbed. An upset of the nervous system, combined with an increase in blood pressure and cerebral fluid due to low potassium content, can lead to severe headaches.

- Reducing the risk of stroke

Because of potassium's role in regulating the nervous system, heart function, and even fluid balance, a diet high in potassium can help reduce the risk of stroke. What's more, this benefit has been shown to be stronger when potassium comes from natural food sources rather than supplements.

- Improving Heart Health

Potassium is needed for the smooth functioning of muscles. The contraction and relaxation cycles of muscles, including the heart, depend on potassium metabolism. A mineral deficiency may play a role in the development of an arrhythmia or an irregular heartbeat.

- Lowering blood pressure

In the human body, there is a mechanism known as sodium-potassium metabolism. It is essential for cell metabolism, fluid balance and proper heart function. The modern diet is most often almost devoid of potassium and has a high amount of sodium. This imbalance leads to an increase in blood pressure.

- Bone Health Support

Studies have shown that potassium, found in abundance in fruits and vegetables, plays an important role in improving bone health. Potassium has been found to reduce bone resorption, the process by which bone breaks down. Therefore, a sufficient amount of potassium leads to an increase in bone strength.

- Prevention of muscle cramps

As noted, potassium is essential for muscle function and fluid regulation in the body. Without enough potassium, the muscles can spasm. In addition, regular consumption of foods rich in potassium can help with menstrual cramps.

Not only does eating delicious potassium-rich fruits, vegetables, and legumes help prevent muscle cramps, it also reduces muscle weakness and fatigue. This provides more energy to move throughout the day and make the most of your time. For athletes with more demanding exercise schedules, getting the maximum amount of potassium from food will help overall performance. This means that potassium-rich foods should be included in every meal and snack, as well as in concentrated and recovery shakes.

- Help in the fight against cellulite

We often associate cellulite with high fat intake and low physical activity. However, one of the main factors, in addition to genetics, is also the accumulation of fluid in the body. This occurs with

increased salt intake and insufficient potassium intake. Try introducing more potassium rich foods into your diet on a regular basis and you will see cellulite reduction and overall health improvement.

- Healthy weight support

One of the most important benefits of adequate potassium intake, among others, is its impact on healthy body weight levels. This effect is observed because potassium helps to recover weakened and tired muscles, improves heart health, helps the nervous system and maintains the balance of fluids in the body. In addition, foods rich in potassium, as a rule, are nutritious and low-calorie - there will simply be no place left for “harmful” food in the stomach.

Potassium metabolism

Potassium is the main intracellular cation in the body. Although the mineral is found in both intracellular and extracellular fluid, it is more concentrated within cells. Even small changes in the concentration of extracellular potassium can greatly affect the ratio of extracellular to intracellular potassium. This, in turn, affects nerve transmission, muscle contraction, and vascular tone.

In unprocessed foods, potassium occurs mainly in association with precursors such as citrate and, to a lesser extent, phosphate. When potassium is added to food during processing or to vitamins, it is in the form of potassium chloride.

A healthy body absorbs about 85 percent of the dietary potassium it consumes. High intracellular potassium concentration is maintained by sodium-potassium-ATPase metabolism. Since it is stimulated by insulin, changes in plasma insulin concentration can affect the extracellular potassium concentration and hence the plasma potassium concentration.

About 77-90 percent of potassium is excreted in the urine. This is because, at steady state, the correlation between dietary potassium intake and urinary potassium is quite high. The rest is excreted mainly through the intestines, and a much smaller amount is excreted in sweat.^[4]

Interaction with other trace elements:

- **Sodium chloride:** potassium softens the pressor effect of sodium chloride. Dietary potassium increases the excretion of sodium chloride in the urine.
- **Sodium:** Potassium and sodium are closely related, and if the ratio of the two elements is incorrect, the risk of kidney stones and hypertension can be increased^[4].
- **Calcium:** Potassium improves calcium reabsorption and also has a positive effect on bone mineral density.
- **Magnesium:** Magnesium is essential for optimal potassium metabolism in cells, and the correct ratio of mania, calcium and potassium can reduce the risk of stroke^[5].

Healthy Potassium Food Combinations

Yogurt + Banana: Combining potassium-rich foods with protein helps build muscle tissue and replenish amino acids that are lost during physical activity. Such a dish can be consumed both for breakfast and as a snack after a workout^[8].

Carrots + Tahini: Carrots are considered to be incredibly healthy - they contain healthy carbohydrates, fiber, vitamins A, B, K and potassium. Tahini (sesame paste) also includes a large amount of vitamins and minerals, as well as proteins. The fiber found in tahini helps reduce calorie intake and is also anti-inflammatory and supports gut health.

Olives + Tomatoes: Olives are an excellent source of fiber, which supports the functioning of the gastrointestinal tract and stimulates the intestines. Tomatoes, in turn, contain a unique antioxidant lycopene, as well as vitamin A, iron and potassium ^[7].

Rules for cooking foods with potassium

During the food processing of foods containing potassium, a sufficiently large amount of it is lost. This is due to the high solubility of potassium salts in water. For example, boiled spinach, from which excess liquid was removed with a colander, contains 17% less potassium than its raw version. And the difference in the amount of potassium between raw and boiled kale is almost 50% ^[1].

Application in official medicine

Medical studies show that a high intake of potassium has a protective effect against a number of pathologies affecting the cardiovascular system, kidneys and skeleton.

In addition, there is growing evidence that increasing the amount of potassium in the diet has a positive effect on muscle function, general condition and the frequency of falls. ^[10].

- Osteoporosis

Positive dynamics in the growth of bone mineral density was noted in pre-, post- and menopausal women, as well as older men, who consumed from 3000 to 3400 mg of potassium per day.

Foods rich in potassium (fruits and vegetables) usually also contain many bicarbonate precursors. These buffer acids are found in the body to stabilize acid levels. Western diets today tend to be more acidic (fish, meats and cheeses) and less alkaline (fruits and vegetables). In order to stabilize the body's pH, alkaline calcium salts are released in the bones to neutralize ingested acids. Eating more fruits and vegetables with potassium lowers the total acid content of the diet and may help maintain healthy bone calcium levels.

- Stroke

Doctors attribute the reduction in stroke rates to higher potassium intake, as indicated by several large-scale epidemiological studies.

Overall, the evidence suggests that a modest increase in potassium-rich foods can significantly reduce the risk of stroke. This is especially true for people with high blood pressure and/or relatively low potassium intake.

- salt substitutes

Many salt substitutes contain potassium chloride as a replacement for some or all of the sodium chloride in the salt. The potassium content of these foods varies widely - from 440 to 2800 mg of potassium per teaspoon. People suffering from kidney disease or using certain medications should consult their healthcare provider before taking salt substitutes due to the risk of hyperkalemia caused by the high levels of potassium in these foods ^[9].

- **Stones in the kidneys**

There is an increased risk of kidney stones among people with high levels of calcium in the urine. It can also be associated with a lack of potassium. Urinary calcium excretion can be reduced by increasing calcium intake or by adding potassium bicarbonate ^[2].

In dietary supplements, potassium is often present as potassium chloride, but many other forms are also used, including potassium citrate, phosphate, aspartate, bicarbonate, and gluconate. The nutritional supplement label usually lists the amount of elemental potassium in the product, not the weight of the total potassium-containing compound. Some dietary supplements contain microgram amounts of potassium iodide, but this ingredient serves as a form of the mineral iodine, not potassium.

Not all multivitamin/mineral supplements contain potassium, but those that do have potassium typically include around 80mg. Potassium-only supplements are also available, and most contain up to 99 mg of the mineral.

Many manufacturers and distributors of nutritional supplements limit the amount of potassium in their products to only 99 mg (which is only about 3% of the recommended amount). Some oral medications that contain potassium chloride are considered unsafe because they are associated with damage to the small intestine.

potassium during pregnancy

Potassium plays an important role in maintaining the balance of fluids and electrolytes in the cells of the body. In addition, he is responsible for sending nerve impulses, helping muscle contraction. Blood volume increases by up to 50% during pregnancy, so the body needs more electrolytes (sodium, potassium and chloride in combination) to maintain the correct chemical balance in the fluids. If a pregnant woman has leg cramps, one of the reasons may be a lack of potassium. During pregnancy, hypokalemia can be observed primarily due to the fact that a woman loses a lot of fluid during morning sickness in the first months. Hyperkalemia is also very dangerous during pregnancy, as it can lead to quite serious heart problems. Fortunately, it is less common in practice and is associated mainly with kidney failure, alcohol or drug use, extreme dehydration, and type 1 diabetes ^[11,12].

Application in traditional medicine

In folk recipes, potassium plays an important role in the treatment of diseases of the heart, gastrointestinal tract, osteoporosis, nervous system and kidneys.

A well-known remedy for many diseases is a solution of potassium permanganate (the so-called "potassium permanganate"). For example, folk healers suggest taking it for dysentery - inside and in the form of an enema. It should be noted that this solution must be used with great care, since an incorrectly selected dose or poorly mixed solution can lead to serious chemical burns ^[13].

Folk recipes mention the intake of foods rich in potassium for heart problems and water metabolism disorders. One such product, for example, is sprouted grains. They contain potassium salts, as well as many other useful trace elements ^[14].

For kidney health, traditional medicine, among other things, advises eating grapes rich in glucose and potassium salts. It is also a good remedy for diseases of the heart, bronchi, liver, gout, nervous exhaustion and anemia ^[15].

Potassium in recent scientific research

- Herbs, including cilantro, have a long history of use as anticonvulsants in folk medicine. Until now, many of the basic mechanisms by which herbs work have remained unknown. In a recent study, scientists have discovered a new molecular action that allows cilantro to effectively delay certain seizures that are common in epilepsy and other diseases. "We found that cilantro, which is used as an unconventional anticonvulsant drug, activates a class of potassium channels in the brain that reduce seizure activity," said Jeff Abbott, Ph.D., professor of physiology and biophysics at the University of California, Irvine School of Medicine. "In particular, we found that one component of cilantro, called dodecanal, binds to a specific part of the potassium channels to open them, reducing cell excitability. This particular discovery is important because it could lead to more effective use of cilantro as an anticonvulsant, or modification of dodecanal to develop safer and more effective anticonvulsants." "In addition to anticonvulsant properties, cilantro also has the potential for anticancer, anti-inflammatory, antifungal, antibacterial, cardioprotective, and analgesic effects," the scientists added ^[16].
- Not so long ago, a new study was published on the causes of death from cardiovascular diseases. Scientists have come to the conclusion that insufficient consumption of vegetables and fruits leads to an incredible number of deaths every year - we are talking about millions of people. It was found that in about 1 out of 7 deaths from heart and vascular diseases could be prevented by the timely introduction of a sufficient amount of fruit into the diet, and in 1 out of 12 by eating vegetables. As you know, fresh fruits and vegetables contain a storehouse of nutrients - fiber, potassium, magnesium, antioxidants, phenols. All of these micronutrients help maintain normal blood pressure levels and lower cholesterol levels. In addition, they maintain the balance of bacteria in the digestive tract. People who eat plenty of fresh vegetables and fruits are also less likely to become obese or overweight, and potassium plays one of the most important roles in this. Scientists have found that in order to avoid the risk of cardiovascular disease, the optimal amount of fruit that should be consumed per day is 300 grams - which is about two small apples. As for vegetables, they should be 400 grams in the daily diet. Moreover, the best way to cook is to eat it raw. For example, to meet the norm, it will be enough to eat one medium-sized raw carrot and one tomato ^[17].
- The researchers were able to determine the cause of a recently discovered serious disease that causes epileptic seizures, loss of magnesium in the urine and decreased intelligence in children. Using genetic analysis, the researchers found that the disease is caused by a recent mutation in one of four forms of sodium-potassium metabolism known as sodium-potassium adenosine triphosphatase. New knowledge about the disease is likely to mean that doctors in the future will be more aware that magnesium deficiency associated with epilepsy can be caused by genetic defects in sodium-potassium metabolism ^[18].

Weight regulation

Traditionally, potassium is not perceived as an aid in weight loss. However, with the study of its mechanisms of action and functions, this opinion is gradually changing. Potassium aids in weight loss through three main mechanisms:

1. Potassium helps improve metabolism and energy: it provides our body with the components it needs to provide energy during physical activity and helps it use the metabolism-boosting nutrients iron, magnesium, and calcium.
2. Potassium Helps Gain Muscle Mass: When combined with magnesium, it aids in muscle contraction and growth. And the stronger the muscles, the more calories they burn.
3. Potassium prevents excessive retention of fluids in the body: together with sodium, potassium helps maintain the exchange of fluids in the body, the excess of which also adds the number of kilograms on the scale ^[20].

Use in cosmetology

Potassium can often be seen in a variety of cosmetic products. There are many forms in which it is used - potassium aspartate, potassium bicarbonate, potassium bromate, potassium castorate, potassium chloride, potassium hydroxide, potassium silicate, potassium stearate, etc. These compounds are most commonly used in skincare, oral hygiene and hair products. Depending on the specific compound, it can act as a conditioner, acidity regulator, antiseptic, stabilizer, emulsifier and thickener. Potassium lactate has a moisturizing effect due to its ability to bind water molecules and the breakdown products of an amino acid called serine. Many potassium compounds in high doses can cause irritation and burns, as well as being carcinogenic ^[19].

Contraindications and warnings

Signs of potassium deficiency

Low plasma potassium concentration ("hypokalemia") is most often the result of excessive loss of potassium, for example, due to prolonged vomiting, the use of certain diuretics, some forms of kidney disease, or metabolic disorders.

Conditions that increase the risk of hypokalemia include diuretic use, alcoholism, severe vomiting or diarrhea, overuse or abuse of laxatives, anorexia nervosa or bulimia nervosa, magnesium deficiency, and congestive heart failure.

Low dietary potassium intake usually does not lead to hypokalemia.

Symptoms of abnormally low plasma potassium ("hypokalemia") are associated with changes in membrane potential and cellular metabolism; they include fatigue, muscle weakness and cramps, bloating, constipation, and abdominal pain. Severe hypokalemia can lead to loss of muscle function or abnormal heart rhythm, which can be fatal ^[2].

Signs of excess potassium

In healthy people, an excess of potassium from foods, as a rule, does not occur. However, in excess, vitamins and nutritional supplements containing potassium can be toxic in excellent health. Chronic use of large amounts of dietary potassium supplements can lead to hyperkalemia, especially in people with impaired excretion of substances from the body. The most serious symptom of this disease is cardiac arrhythmia, which can result in cardiac arrest. In addition, some potassium supplements may cause gastrointestinal discomfort. Other symptoms of hyperkalemia can include numbness in the hands and feet, muscle weakness, and temporary loss of muscle function (paralysis) ^[2].

Interaction with medications

Some medications can affect the level of potassium in the body. For example, medications taken to treat hypertension and heart failure in patients with chronic kidney disease or type 2 diabetes can reduce the amount of potassium excreted in the urine and, as a result, lead to hyperkalemia. Diuretics have the same effect. Experts advise monitoring potassium levels in patients taking these drugs ^[2].

Literature

1. Potassium. Nutrient Metabolism. Elsevier Ltd, 2003, pp 655-660. ISBN: 978-0-12-417762-8
2. Potassium. Nutri-Facts, [source](#)

3. Newman, D. (2000). Potassium. In K. Kiple & K. Ornelas (Eds.), *The Cambridge World History of Food* (pp. 843-848). Cambridge: Cambridge University Press. DOI:10.1017/CHOL978052149.096
4. Linda D. Meyers, Jennifer Pitz Hellwig, Jennifer J. Otten, and Institute of Medicine. Potassium. *Dietary Reference Intakes: The Essential Guide to Nutrient Requirements*. National Academies, 2006. 370-79.
5. Vitamin and Mineral Interactions: The Complex Relationship of Essential Nutrients, [source](#)
6. Top Potassium-Rich Foods and How They Benefit You, [source](#)
7. 13 Food Combinations That Can Speed Up Your Weight Loss, [source](#)
8. 7 Food Combos You Must Try for Better Nutrition, [Source](#)
9. Potassium. Fact Sheet for Health Professionals. National Institutes of Health. Office of Dietary Supplements, [source](#)
10. Lanham-New, Susan A et al. Potassium. *Advances in nutrition* (Bethesda, Md.) vol. 3.6 820-1. Nov. 1 2012, DOI:10.3945/an.112.003012
11. Potassium in your pregnancy diet, [source](#)
12. Potassium and Pregnancy: Everything You Need to Know, [source](#)
13. *The Complete Encyclopedia of Folk Medicine*. Volume 1. OLMA Media Group. Page 200.
14. *Great Encyclopedia of Folk Medicine*. OLMA Media Group, 2009. Pp. 32.
15. G. V. Lavrenova, V. D. Onipko. *Encyclopedia of Folk Medicine*. OLMA Media Group, 2003. Pp. 43.
16. Rían W. Manville, Geoffrey W. Abbott. Cilantro leaf harbors a potent potassium channel-activating anticonvulsant. *The FASEB Journal*, 2019; fj.201900485R DOI:10.1096/fj.201900485R
17. American Society for Nutrition. "Millions of cardiovascular deaths attributed to not eating enough fruits and vegetables: Study tracks toll of suboptimal fruit and vegetable intake by region, age and gender." *ScienceDaily*. ScienceDaily, 10 June 2019. www.sciencedaily.com/releases/2019/06/190610100624.htm
18. Karl P. Schlingmann, Sascha Bandulik, Cherry Mammen, Maja Tarailo-Graovac, Rikke Holm, Matthias Baumann, Jens König, Jessica JY Lee, Britt Drögemöller, Katrin Imminger, Bodo B. Beck, Janine Altmüller, Holger Thiele, Siegfried Waldegger, William van't Hoff, Robert Kleta, Richard Warth, Clara DM van Karnebeek, Bente Vilsen, Detlef Bockenhauer, Martin Konrad. Germline De Novo Mutations in ATP1A1 Cause Renal Hypomagnesemia, Refractory Seizures, and Intellectual Disability. *The American Journal of Human Genetics*, 2018; 103 (5): 808 DOI:10.1016/j.ajhg.2018.10.004
19. Ruth Winter. *A Consumer's Dictionary of Cosmetic Ingredients*, 7th Edition: Complete Information About the Harmful and Desirable Ingredients Found in Cosmetics and Cosmeceuticals. Potter/Ten Speed/Harmony/Rodale, 2009. Pp 425-429
20. Three Ways Potassium Helps You Lose Weight, [source](#)
21. Facts about Potassium, [source](#)

[An extended HTML version of this article](#) is available on the edaplus.info website.

Potassium - description, benefits and sources

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

Myronenko Anastasiia , nutritionist

E-mail: eliseeva.t@edaplus.info, myronenko.a@edaplus.info

Received 07/15/19

Abstract. The article discusses the main properties of potassium (K) 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 potassium are indicated. The use of the mineral in various types of medicine and the effectiveness of its use in various diseases are considered. The potentially adverse effects of potassium on the human body under certain medical conditions and diseases are analyzed separately.



The Dukan Diet - Scientific Rationale, Proven Health Benefits, Advantages and Disadvantages

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

Tkacheva Natalia, phytotherapist, nutritionist

Email: eliseeva.t@edaplust.info, tkacheva.n@edaplust.info

Abstract. The Dukan Diet is a popular no-carbohydrate, fat-restricted diet. The emphasis of this diet is on lean protein foods, as well as a daily intake of fiber in the form of oat bran. Simple carbohydrates and sugars are excluded. Despite extensive restrictions, Dr. Dukan's nutrition program does not require scrupulous control of nutrient intake, careful calorie counting, or severe fasting. Weight will decrease if the principles of each stage of the diet are followed. It is enough to make up your diet from the products that Dukan offers in his weight loss program. Consider this method of weight loss from a scientific point of view and analyze its effectiveness.

Tags: Dukan's diet, Dukan's diet

celebrity diet

The Dukan diet has gained extreme popularity in recent years, especially among representatives of the modeling business and celebrities. Many of them owe their harmony and attractive forms to her.

The diet has become popular due to the fact that it changes metabolism and allows for sustainable weight loss. Rapid and sustainable weight loss with minimal hunger also speaks in its favor. But health experts criticize the Dukan meal plan. They call the diet overly restrictive, uncomfortable, and detrimental to health due to imbalance.

The history of the popularity of Pierre Ducane

The Dukan diet was named after the French physician Pierre Dukan, its creator. It was an effective method of getting rid of obesity, without the effect of returning to previous numbers after the end of dietary restrictions. This is a common problem that people experience following low-calorie diets or healthy eating practices.

Pierre Dukan was born in 1941 in Algeria. He was a general practitioner, planned to become a neurologist. From one patient who needed to lose weight, Dr. Dukan heard this: "You can give me any diet. I can refuse any food except meat. I can't refuse meat." Thus was born the idea of a new diet for obesity. The patient was instructed to eat as much meat as he wanted, provided that it was meat with a minimum fat content, and to drink plenty of water. And in 5 days the patient lost 5 kg. And Dr. Dukan embarked on the path of world fame and wealth, having found his vocation in medicine.

The Dukan diet has been known for more than a third of a century, but it gained its main fame after the publication of the book "I Can't Lose Weight" in 2000. Over 10 million copies of the book, translated into 14 languages, have been sold worldwide in 32 countries.

Over the past 20 years, about two million French people are believed to have tried this diet. About 30 thousand paid subscriptions are active on Dukan's official website. On the shelves of shops and pharmacies in France, about 50 products are sold under the brand name "Dukan Diet". And the turnover of the business of the author of the diet is estimated at 100 million euros per year.

Where to start a diet?

Given that the diet is built on strict restrictions, the founders recommend thorough preparation before starting to stick to it.

1. **Calculate your true weight.** This will determine the target weight. You can create an individual program, determine the duration and target points of the first three stages of the weight loss diet.
2. **Identify your motivational reasons** why you need to lose weight. Write down the sources of motivation. In the future, this will help you achieve your goal, not break before the restrictions on which the diet is based.
3. **Consult your healthcare professional** or licensed dietitian. It is recommended that you undergo a complete check-up - blood pressure, blood test, stress test and other tests recommended by your doctor.
4. **Enlist the support of family and friends** . It is important to have allies in the fight against excess weight. It is also possible to communicate on the official website with like-minded people - participants in the Dukan weight loss program.
5. **Determine the starting point for starting the diet.** Let this day be the start of your journey to weight loss and other changes.
6. **Filter the products in your kitchen** . If there are only allowed products in your house, and you make purchases strictly according to the list, you will not be tempted to eat something "forbidden".
7. **Decide in what mode you will follow the diet.** Independently, according to the book of Pierre Dukan, with a friend or like-minded relative, in the online community of the Dukan group, an online support program on the official website of the Dukan diet. The higher the motivation and support, the easier it will be to achieve the desired goal.

If all the preparatory stages have been completed, you can go directly to the diet, starting the attack phase. ^[one]

What is true weight?

One of the first steps in the Dukan Diet is determining your true weight. It is true, not ideal or desired. It's not just a number you want to see on the scale. True weight is really possible to achieve without harm to your body, without affecting your mood. It can be maintained for a long time without hunger and food restrictions.

The "true weight" category is unique to the Dukan diet. The official website of the diet offers an automated calculation of true weight. It is enough to answer a few simple questionnaire questions. The history of your weight, its minimum, maximum value and the desired weight from your point of view, previous stays on other diets and the Dukan diet are taken into account. Age, gender, number of pregnancies in women, heredity, bone structure and some other parameters are also important.

True weight will be the target point for the diet. The difference between your current weight and your "true weight" determines your individual diet plan, the length of each of the first three phases of the Dukan Diet, and how much weight you can lose in the attack, cruise, and consolidation phases. ^[2]

Basic Structure of the Dukan Diet

After determining the "true weight", you can proceed directly to the diet, which is divided into 4 stages. Each of them is characterized by its own rules.

1. **Attack phase (1 - 7 days)** . This is a short-term phase during which you can consume lean protein foods and 1.5 tablespoons of oat bran daily without restrictions. The duration of this phase is determined by the amount of weight you have planned to lose. The first phase may be limited to 1-2 days with a target loss of up to 4 kg. If the planned weight loss is more than 18 kg, then the attack phase can last up to 7 days. At this time, excess fluid is excreted from the body. **It is especially important during this period to drink enough clean water.**
2. **Cruise phase (1 – 12 months)** . This phase consists in alternating diets every other day. One day with only lean protein foods without restrictions. Second day with lean protein foods and non-starchy vegetables. Every day you need to use the same two tablespoons of oat bran. In this phase, weight loss continues to the desired figure.
3. **Consolidation phase (10 days for every kilogram lost)** . At this stage, "true weight" has been reached" and you can move on to eating with less restrictions. The diet will consist of the same lean protein dishes and almost any vegetables. Some starchy foods, grains, hard cheese and various fruits are allowed. There is a "free" lunch once a week, when absolutely everything can be consumed without exception. But also once a week, a "limiting" day with exclusively lean protein products is recommended. As before, you need to add two tablespoons of bran to the diet daily.
4. **Stabilization phase (duration without limits)** . One day a week will still be dietary - with exclusively lean protein foods. The rest of the time you can eat any food with a daily addition of three tablespoons of bran.

Dukan Diet Modification: 7 Steps

There is a modification of the Dukan diet - a meal plan for a week, which also helps to achieve the "true" weight, although not as quickly as the original method. It is easier to follow such a diet, since the set of acceptable foods changes every day for a week.

- Day 1: Protein products;
- Day 2: Protein foods and vegetables;
- Day 3: Protein foods, vegetables and fruits;
- Day 4: Protein foods, vegetables, fruits and bread;
- Day 5: Protein foods, vegetables, fruits, bread and cheese;
- Day 6: Protein foods, vegetables, fruits, bread, cheese and complex carbohydrates;
- Day 7: Day without restrictions. Chocolate and wine are allowed for the festive dinner.

Benefits of the Dukan Diet

- Lack of feeling of hunger. You can eat without limiting the size of portions and at any time of the day. The main thing is to choose allowed products.
- Foods allowed in the diet are familiar and affordable. There is no need to give up eating out or on holidays, because you can always choose clean meat dishes, seafood or fish without a side dish or with vegetables.
- Various studies have been conducted on the Dukan diet, mainly to study the effectiveness of this diet. In Nysa (Poland), the University of Applied Sciences observed the effectiveness of the diet on a group of women for 8-10 weeks. As a result, the average weight loss was 13 kg.

Repeated studies of high-protein and low-carbohydrate diets have shown:

- speeding up metabolism, increasing fat burning and increasing the feeling of satiety, which in total contributed to weight loss.
- There is a connection with the hormone ghrelin, which stimulates the feeling of hunger. Increased consumption of protein foods helps to reduce the level of this hormone.
- The diet defines clear rules for the selection of products that are included in the diet or are strictly prohibited. This makes dieting easier to plan and less likely to make mistakes. You simply choose the appropriate product from the proposed options at this stage of the diet.

This can be attributed to the benefits of this diet plan. However, there are also serious drawbacks for which the Dukan diet is often condemned.

Disadvantages of the Dukan Diet

- Refusal of fats. Pierre Dukan deliberately ignores the need of a healthy person for fats of at least 40-50 grams daily. Lack of fat intake leads to an imbalance of minerals, absorption of calcium and vitamin D. In the study mentioned at the beginning of this section, an increased intake of proteins, potassium, iron, vitamins A, B2 and D was found. There was a lack of vitamin C and folate .
- The diet does not form sustainable eating habits that would allow long-term maintenance of the achieved weight. Four out of five people who lose weight using the Dukan diet return to their original weight in 2-3 years. Weight loss itself is due to ketogenic processes that are activated in the first phases of the diet. But upon completion of the weight loss program, the subjects were happy to return to a varied diet - and the effect was lost.
- If you need to lose significant weight, you need to stick to a diet for a long time. And in the long term, such a limited diet can seriously harm health and disrupt normal metabolism.
- Also, diets that are characterized by a strict restriction of foods allowed in the diet lead to increased cravings for "forbidden" foods and the risk of breakdowns and overeating.
- The predominance of protein foods in the diet, as well as the promotion of days with exclusively pure protein meals, can have negative health consequences. The symptoms of arthritis, gout may intensify or worsen. It also increases the risk of kidney stones. The diet is absolutely not acceptable for patients with renal insufficiency.

From the reviews of adherents of the diet, one can also distinguish:

- It is difficult to completely abandon fruits in the first two phases of the diet, and then fruits are allowed rather conditionally, in small quantities. Even the unlimited use of protein dishes quickly "gets boring", I want variety.
- Throughout the diet on protein days, the smell of acetone is felt from the mouth. It appears due to the restructuring of metabolic processes towards ketosis.
- Constant thirst. This is due both to the difficult mechanism of digestion of protein foods, and to ketosis processes that enhance the removal of fluids from the body.

- Due to the limited amount of various fiber in the diet and the abundance of heavy protein foods, in the early stages there are difficulties with digestion. Oat bran is supposed to help with this problem, but the effect is not sufficient.

Despite the fact that the Dukan diet contributes to a quick result in weight loss, however, do not ignore alternative diets that, in addition to losing weight, also improve health. You can enjoy a healthy and varied diet rich in healthy fats, fruits and vegetables, and whole grains. Then, along with losing weight, your body will receive the necessary nutrients.

Comparison of the Dukan Diet, the Ketogenic Diet, and the Atkins Diet

There are three popular carbohydrate-reducing diet plans for weight loss - the Dr. Dukan Diet, the Ketogenic Diet, and the Atkins Diet. With a general similarity in direction, there are fundamental differences in these diets.

The Dukan and Atkins diets advocate reducing the proportion of carbohydrates in the diet and increasing the intake of proteins.

At the same time, the Dukan diet reduces, in addition to carbohydrates, fats as well - in favor of proteins. And the Atkins diet allows unlimited consumption of fats and proteins. The ketogenic diet requires a predominance of fats in order to achieve the necessary metabolic state - ketosis. With it, the cells of the body begin to eat fats instead of carbohydrates. At the same time, it is permissible to use proteins very moderately.

Is the Dukan Diet Safe?

At present, the safety and effectiveness of the Dukan diet has not been sufficiently studied, so it is not yet possible to assume with certainty the long-term consequences of this diet.

However, doctors are already wary of such restrictive methods of losing weight. The complete exclusion of many foods leads to a lack of important minerals, vitamins and nutrients. This will especially affect the course of such conditions as arthritis, gout, kidney and liver diseases. If you have any health concerns, you should consult your healthcare professional or licensed dietitian before following the Dukan Diet. ^[3]

What food preferences go with the Dukan Diet?

- **Vegetarian and vegan diet** : The Dukan diet is based on a large amount of animal proteins - meat, poultry and eggs, fish, shellfish, low-fat dairy products. Of the vegetarian proteins, only seitan, tofu, and tempeh are allowed. It will be difficult enough to withstand the attack phase (without vegetables and fruits) only on vegetarian proteins without eating animal products. Other vegetarian proteins - legumes, lentils and nuts - cannot be included in the Dukan diet.
- **Low-Fat Diet: If you are on a low-fat diet** for health reasons, such as heart disease, then the Dukan diet may well be suitable. All foods that are allowed in different phases of the diet - proteins, dairy products, vegetables, fruits - are extremely low-fat or completely lean.
- **Gluten Free** : The initial phases of the Dukan Diet follow a gluten free meal plan. However, closer to the consolidation and stabilization phase, the rules are loosened and gluten-free versions of allowed products must be carefully selected. Particular attention should be paid to the choice of oat bran, which is an indispensable component of all phases of the Dukan diet without exception. Oats grown in an ideal environment without impurities of other cereals are considered gluten-free. Instead of gluten, it

contains the protein avenin, which is not dangerous for celiac patients. But in most grain processing industries, gluten-free and gluten-containing crops are intercrossed, so traces of gluten can be found in all products “at the exit”. In gluten-free general health diets, this is not critical. But for celiac patients, oat bran for the Dukan diet must be chosen marked “gluten-free”.

- **Diet for Diabetes:** This is consistent with Dr. Dukan's diet plan. Since the Dukan diet is a low-carbohydrate diet, if you are taking glucose-lowering drugs and / or insulin, you will most likely have to reduce the dose of medication. This is especially true for the attack phase and the cruise phase, when there are very few carbohydrates in the diet. Be careful, beware of episodes of hypoglycemia - a sharp sudden drop in blood glucose to a critically low level, up to hypoglycemic coma. Get additional advice from your treating endocrinologist before starting the Dukan diet.
- **In the presence of chronic diseases of the kidneys, heart, gastrointestinal tract :** The Dukan diet is very limited and can be harmful in the presence of chronic diseases. In kidney disease, the intake of proteins, on which the Dukan diet is based, is limited. With gastrointestinal disorders, it is necessary to consume a sufficient amount of plant fibers. In heart disease, the balance of trace elements and vitamins is important. However, the Dukan diet is monotonous, especially in the early stages, so it can go against medical nutrition plans. ^[four]

Diet Complaints

The Pierre Dukan diet is popular among many celebrities, rich people and royalty. But medical colleagues are not so enthusiastic about the developments of Dr. Dukan.

In France, two complaints were filed against the author of the diet. Pierre Dukan is accused of using medicine as a business, for promoting the system for his own benefit and popularity. At the same time, his recommendations may be harmful, which is contrary to the code of medical ethics.

In fact, Dr. Dukan's diet books became bestsellers in 2000, translated into 14 languages, and sold millions of copies worldwide. An entire industry of products was born that conformed to the principles of the Dukan system. An Internet site has been created and is successfully functioning with advice on weight loss, an individual selection of a dietary program on a paid basis. Dukan's financial benefit is obvious.

In addition, doctors consider one statement by Dr. Dukan to be incorrect. He proposed to include a "obesity test" in the undergraduate examination system. According to his idea, 17-year-old students should be tested according to Dr. Dukan's ideal weight system. Those whose weight is within the "normal" range should receive additional points on the exam. Doctors are against this idea because it could have negative consequences for the eating behavior of young people, especially girls who tend to be anorexic or already overweight. For this proposal, Dukan faced a disciplinary hearing within six months, and then the loss of a license.

They also surveyed 5,000 people who followed the diet, and 80% of them regained the weight they lost three years after the diet.

Experts say that the diet can increase the risk of developing cardiovascular disease, blood pressure and diabetes. There are also serious threats to the liver, kidneys and fertility levels.

However, Dukan himself does not agree with such statements. He told journalists of the newspaper Le Parisien that the diet does not carry risks, but the overweight that patients have before his diet poses a real threat from which people die every day.

French doctor Jean-Michel Cohen speaks negatively about the Dukan diet, believing that only the pharmaceutical industry and doctors who treat "Dukants" after losing weight on a diet, as well as publishers and journalists who write about the popular technique, benefit from it. A protein-rich diet can lead to heart disease and breast cancer. Cohen himself promotes the ideas of counting calories and physical activity as a means to lose weight. Pierre Ducane sued Jean-Michel Cohen for defamation in 2011, but lost. The court was guided by the principles of medical ethics, which were not on the side of Dukan.

Despite its popularity, in 2011 the British Dietetic Association called this diet the "worst celebrity diet".

And already in 2014, the French National Council deprived Ducan of his license and banned him from practicing medicine. ^[5,6]

What You Can Eat on the Dukan Diet

The essence of Dr. Dukan's diet lies in the use of foods rich in proteins, with a limited content of carbohydrates and healthy fats. Depending on the phase of the diet that you have already reached, the diet will also change. Oat bran and lean protein foods are unchanged throughout the diet.

Attack phase

The basis of the diet will be protein-rich foods, both vegetable and animal origin.

- **Lean Meats:** **Lean** veal and pork chop, roast beef, beef and pork tenderloin, low-fat bacon, venison, and other game meats.
- **Meat of domestic and wild birds:** chicken, turkey, quail, wild ducks, etc.
- **Eggs:** chicken and quail eggs, duck eggs (after heat treatment).
- **Fish:** herring, mackerel, flounder, catfish, tilapia, trout, salmon, tuna, sardines, etc.
- **Seafood:** shrimp, oysters, octopus, lobster, mussels, crab, crayfish, etc.
- **Vegetarian proteins:** soy tofu, soy tempeh, gluten-free wheat seitan, veggie burgers, and more.
- **dairy products:** milk, cottage cheese, Greek yogurt, reduced-fat cream cheese. Limit volume to 1 liter or 1 kilogram per day.
- **Oat bran:** 1.5 tablespoons daily.
- **Water:** at least 1.5 liters per day (mandatory).
- A small amount of lemon juice and pickles.

In addition to the listed protein products and oat bran, sugar-free chewing gum, spices, sugar-free coffee and tea, artificial low-calorie sweeteners, diet gelatin are allowed.

Cruise phase

During this period, non-starchy vegetables are added to the products from the list above in one day. The next day, only protein lean foods from the attack phase. Then the days alternate.

During the day, it is allowed to introduce up to two new products from the list of allowed products. In the first days of the transition to this phase, vegetable dishes should be limited in volume, at one meal - up to 2 tablespoons.

On your table will appear:

- Asparagus

- Black Eyed Peas
- Beet
- Broccoli
- Brussels sprouts
- White cabbage
- Cauliflower
- Artichoke
- Carrot
- Celery
- cucumbers
- eggplant
- Tomatoes
- Dill, parsley, celery
- Leafy greens – lettuce, spinach, arugula, watercress
- Rhubarb
- Radish
- radish
- Turnip
- Zucchini
- Zucchini
- Onion, leek, shallot
- Mushrooms
- Pepper
- Spaghetti from pumpkin squash or any other pumpkin, zucchini
- Heartwood of a coconut palm or acai palm
- 1 teaspoon (5 ml) salad dressing oil

Consolidation phase

This phase is usually divided into two parts. In the first half of the phase, the products listed above are added to the diet:

- Fruit - one serving daily. For example, 1 cup (100 g) berries or pulp of watermelon, melon; one medium apple, orange, pear, peach or nectarine; two kiwis, plums or apricots;
- Whole grain bread - two slices daily;
- Hard cheese - 40 grams daily;
- Starchy foods - one serving per week. This can be 225 g of cooked pasta and other grains, corn, beans or legumes, rice or potatoes.
- "Free" lunch, consisting of an appetizer, dessert and a glass of wine - once a week.

In the second half of the consolidation phase, the following products are added:

- Fruits - two servings daily;
- Whole grain bread - two slices daily;
- Hard cheese - 40 grams daily;
- Cooked starchy food - two servings per week;
- "Free" lunch, consisting of an appetizer, dessert and a glass of wine - twice a week.

Required daily two tablespoons of oat bran. Weekly, one day, only lean protein foods are used, which are allowed in the attack phase.

Stabilization phase

A phase without clear boundaries that supports the results of weight loss. Any products are not prohibited for use in this phase. Belonging to the Dukan diet is determined by some rules for this period:

- Daily in the diet should be three tablespoons of oat bran.
- Use the recipes from the Consolidation phase as the basis of nutrition.
- Every week, one day "returns" to foods from the attack phase - low-fat protein meals.
- To increase physical activity, take the stairs instead of using elevators and escalators.

Additionally allowed

- **Shirataki noodles.** You can eat unlimitedly, starting from the first phase of the diet. The homeland of this product is Japan and China, where the root of konjac (cognac) mannan is mined. It is used to make konjac flour, gel or noodles. Regardless of the form of serving, this product contains a minimum amount of carbohydrates and contains absolutely no fat. This allows you to eat shirataki noodles without restrictions and the risk of breaking the diet and gaining weight.
- **Goji berries.** They are a superfood rich in vitamins and minerals. Will be an excellent supplement throughout the diet. Allowed from attack phase. However, on pure protein days, 1 heaping tablespoon is allowed, and on protein and vegetable days, 2 heaping tablespoons are allowed.
- **Olive oil.** Allowed from the cruise phase in a limited amount - 1 teaspoon. Source of omega-3 fatty acids and antioxidant vitamin E [7].

Alcohol is also allowed during the consolidation and stabilization stages - you can drink a glass of wine a day.

There is no need to use any exotic ingredients in diet meals. But at the beginning of the diet - during the attack and cruise stages - the choice of products will be quite limited and of the same type. This can be quite difficult and tiring.

As physical activity, a daily twenty-minute walk is welcome. This will keep the body in good shape.

Literature

1. How to Start The Dukan Diet, [source](#)
2. True Weight - is it the same as ideal weight?, [source](#)
3. Dukan Diet Reviews: Pros & Cons of This Weight Loss Diet Plan, [source](#)
4. The Dukan Diet, [source](#)
5. Dukan diet inventor faces censure, [source](#)
6. French diet guru Pierre Dukan faces ethics hearing, [source](#)
7. Dukan Diet Food List, [source](#)

[An extended HTML version of this article](#) is available on the edaplust.info website.

Dukan Diet - Description of the celebrity diet, history, scientific rationale, proven health benefits, advantages and disadvantages, diet tips

Tkacheva Natalia , phytotherapist, nutritionist

E-mail: eliseeva.t@edaplust.info, tkacheva.n@edaplust.info

Received 09/07/20

Abstract. The Dukan Diet is one of the most popular diet plans for weight loss. This low-carb diet allows you to quickly lose weight without feeling hungry or having to carefully calculate nutrients. The author of the diet has developed a clear list of allowed products for each stage. The difference from other low-carbohydrate diets is the use of protein products without restrictions, which allows you not to feel hungry. Fats and carbohydrates are excluded.

But the diet does not form healthy eating habits and limits the consumption of many foods necessary to maintain health. With a long-term diet, if a large weight loss is planned, this can adversely affect health.