

Blueberries and Your Health



Blueberries are the common name for the group of flowering plants in the genus *Vaccinium*, section *Cyanococcus*. Other sections in the genus, native to other parts of the world such as Europe, include wild shrubs that produce edible berries, including cranberries, bilberries and cowberries. All these berries are known for having important health benefits.

Blueberries are both cultivated and picked wild. In North America, *V. corymbosum* (also known as the northern high-bush blueberry) is the most commonly cultivated species.



Blueberries have many phytochemicals that can be grouped into anthocyanins, proanthocyanidins, phenolic acids and flavonoids. Examples of specific phytochemicals in blueberries are resveratrol and ellagic acid.

The health benefits of blueberries are believed to stem from the diverse range of phytochemicals that are:

- Antioxidants
- Anti-cancer agents
- Anti-neurodegenerative agents
- Anti-inflammatory agents



Because of these properties, many studies have been conducted to explore the potential relationship between the components found in blueberries and other berries and the prevention of chronic diseases.

What are phytochemicals?

Phytochemicals, commonly referred to as phytonutrients, are naturally occurring non-nutritive (not required in the diet like nutrients) components of fruits and vegetables. They are said to be bioactive and are considered to have beneficial effects on human health. They usually are the colored compounds in fruits and vegetables that give those foods the blue, red and purple coloration. They are induced in plants by ultraviolet radiation, plant diseases and microbial attacks.



Cancer risks reduced by blueberry consumption

Berry fruits, particularly blueberries, have been investigated concerning their roles in cancer prevention. Several different cancers seem to respond to the phytochemicals found in fruits and vegetables. Those include oral, breast, colon and prostate cancers. In many studies, specific phytochemicals such as kaempferol and quercetin have been shown to enhance the elimination of cancerous cells, while other phytochemicals such as chlorogenic acid, pterostilbene and ursolic acid were found to be strong antioxidants that eliminate free radicals. Free radicals are harmful compounds that cause damage to cellular proteins and DNA.



Research shows inhibition of cancer cell growth by blueberry extracts

A study evaluated the ability of six different berry extracts (including blueberry extract) to inhibit the growth of human oral, breast, colon and prostate tumor cells at differing concentrations (25 to 200 µg/ml). Those studies showed that the greater the concentration of the berry extract, the greater the inhibition of cell growth, translating to lower risks for cancer when a berry extract was present.

Another study looked at the effect of 10 different extracts of fruits and berries on colon and breast cancer cell growth. This study also found the effects of these extracts to be concentration dependent and noted that of the 10 extracts tested (at the highest concentration used), blueberry extract exhibited the greatest effects on colon cancer cells.

Determining effective compounds from blueberries

To determine which component of blueberry extract was responsible for these anti-cancer properties, one study separated blueberry extract based on its known compounds. This separation resulted in four different pieces: the flavanol, tannin, phenolic acid and anthocyanin fractions. Although all four fractions showed inhibition of cell growth, the anthocyanins were shown to be the strongest, inhibiting cancer cell growth at much lower concentrations than the other fractions.

Heart disease risk lower with regular blueberry consumption

It is known that regular consumption of fruits and vegetables lowers the risk for developing heart disease. A study examined the effects of blueberry consumption in relation to heart disease risk. Participants (chronic cigarette smokers) consumed either 250 grams of blueberries a day for three weeks or one dose of 250 grams of fruit. Several markers of oxidative stress were examined along with a marker of antioxidant potential. A significant decrease in one marker of oxidative stress was found among those who consumed fruit on a daily basis but not in those who only ate it just once. This suggests that obtaining the greatest level of benefits from fruits means consuming them on a regular basis.

A large-scale Nurse's Health Study showed those consuming the most berries had the lowest number of heart attacks. The protective effect against heart disease and heart attacks are thought to stem from the effects of polyphenols on lipoproteins. Circulating phytochemicals in the bloodstream protect lipoproteins against oxidation and there is therefore less damage to the arterial walls.

Alzheimer's risk, other neurodegenerative diseases reduced with regular blueberry consumption

The consumption of blueberries also is believed to possibly play a role in delaying the development of neurodegenerative diseases, such as Alzheimer's disease. There have been several studies in laboratory animals that show promising results. One study fed blueberry extracts to laboratory animals for eight weeks. The researchers noted a reversal of age-related deficits in both neuronal signaling and negative behavioral parameters in the animals. Although the researchers believed the improvements seen were due to the polyphenols in the blueberry extract, it was not evident whether or not these phytonutrients entered the brain.

Study shows blueberry phytochemicals can enter brain

A further study for eight to 10 weeks on spatial learning and memory measures was conducted. Results showed anthocyanins were found in the brain, and there was a positive relationship between spatial learning and memory and the anthocyanin content of the cortex. Researchers concluded the polyphenols can enter the brain.



In human studies, large-scale studies have shown increased intake of berries (i.e., phytochemicals) reduces the risk of cognitive decline seen with aging.

Gastrointestinal health thought to improve with berry consumption

The consumption of phenolic compounds in berries also has been suggested to play a role in gastrointestinal health. One study found these compounds inhibited the growth of several intestinal pathogens, such as Salmonella and Staphylococcus.



Berries may reduce incidence of ulcers

Another study examined the effect of six different berries (raspberries, strawberries, cranberries, elderberries, blueberries, and bilberries) on inhibiting the growth of *Helicobacter pylori*. *H. pylori* is a bacterial infection that can become serious if left untreated. It has the potential to progress to gastritis (irritation and inflammation of the lining of the stomach), peptic ulcer disease (characterized by sores in the stomach or the duodenum) and possibly even stomach cancer later in life. This particular study was done to determine the effects of the berries alone and also in combination with a drug, clarithromycin. Clarithromycin is used to treat peptic ulcers, but *H. pylori* can become resistant to clarithromycin. The study found that, when compared with the controls, all berries significantly inhibited growth of *H. pylori* and that the berry extracts also increased the susceptibility of *H. pylori* to clarithromycin.

A blend of the six berries, referred to as Optiberry, also was tested in that experiment. It was shown to exhibit the greatest effects on *H. pylori*. Because of these inhibitory effects on several intestinal pathogens, it has been suggested the antimicrobial properties of berries could be used to develop functional foods for gastrointestinal health.



Blueberries popular, widely used

Blueberries have increasingly gained attention. U.S. Department of Agriculture reports indicate that between the years of 1994 and 2003, annual U.S. consumption of fresh blueberries rose approximately 1.6 times.

This gain in attention is likely due to the increased recognition of the potential human health benefits of regular blueberry consumption.

Blueberries are used in jellies, jams and pies. They are baked into muffins and are an ingredient in many other snacks and delicacies.

Blueberries are increasingly being incorporated into juices, and such combinations are considered a whole new category of juice on the beverage aisle.



Berry-Citrus Summer Salad

Serves: 6

Ingredients:

Salad:

- 1 large navel orange, peeled, sectioned and cut in pieces
- 1 small cucumber, rinsed, peeled and sliced
- 1 cup blueberries, rinsed and drained
- 1 cup sliced seedless red grapes, rinsed and sliced in half
- ¼ cup pine nuts or sliced almonds
- 1 small head of lettuce or other salad green, rinsed and sorted

Dressing (12 servings):

- Juice from one lemon
- 2 tablespoons fresh orange juice
- 1 tablespoon honey
- 1 shallot, rinsed and minced
- 1 cup soybean oil
- 2 tablespoons fresh parsley, rinsed and chopped
- Salt and pepper

Preparation:

Combine dressing ingredients in a blender and mix well. Adjust seasoning with salt and pepper. Set aside. Place lettuce leaves on six plates. Add orange sections, cucumber slices and blueberries to the lettuce leaves. Sprinkle nuts over the salad. Place 2 tablespoons of the dressing over each salad. Serve.



Nutrition Facts

Serving Size 107 g

Amount Per Serving

Calories 131

Calories from Fat 101

	% Daily Value*
Total Fat 11.2g	17%
Saturated Fat 1.6g	8%
Trans Fat 0.1g	
Cholesterol 0mg	0%
Sodium 102mg	4%
Total Carbohydrates 8.1g	3%
Dietary Fiber 1.3g	5%
Sugars 5.4g	
Protein 1.1g	

Vitamin A 5%

Calcium 2%

Vitamin C 23%

Iron 3%

* Based on a 2000 calorie diet

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