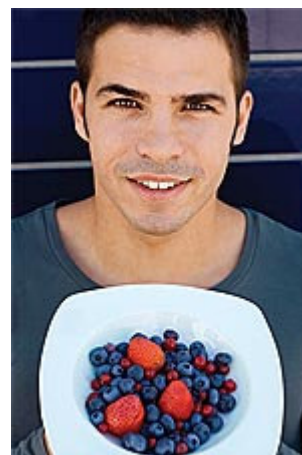


The Disease-Fighting Power of Berries

By Alison Cherlet

Scientists now agree that one of the best ways to protect against the killer diseases of aging is to consume a diet rich in fruits and vegetables.

Yet even the scarce few who manage to consume the recommended five daily servings of fruits and vegetables may not be obtaining enough antioxidant protection to ward off cancer, cognitive decline, and cardiovascular disease. The reason is that it requires about ten daily servings of typically consumed fruits and vegetables to obtain the level of antioxidant protection recommended by USDA scientists.¹



Fortunately, berries and other richly colored plants possess supercharged antioxidant power, allowing you to dramatically boost your levels of antioxidant protection. By stoking up the body's defenses against damaging free radicals, berries and other richly colored foods provide unprecedented protective effects.²

A Rainbow of Health Benefits

During a typical mealtime, take a look at your plate. If you're not seeing a rainbow of color, you may be missing out on some major disease-preventing nutrients. Leading physicians are advising that as many richly colored fruits and vegetables as possible be consumed in order to safeguard our health.

Why all the fuss about color? Because a wealth of scientific studies have demonstrated that the natural pigments that give fruits and vegetables their vibrant hues offer remarkable health benefits. A major class of compounds in this category is the flavonoids. Powerful antioxidants, flavonoids are linked with health benefits that include protection from cancer, cardiovascular disease, dementia, diabetes, and stroke, to name just a few.¹



Antioxidants provide health benefits by subduing free radicals, which play a role in the development of many age-related diseases. The antioxidant value of a food can be estimated using a measure called oxygen radical absorbance capacity, or ORAC. Foods with a higher ORAC value possess a higher ability to quench dangerous oxygen free radicals in the test tube.² Scientists have found that boosting your daily intake of foods with high ORAC values increases the body's plasma and tissue antioxidant protection, guarding your body's tissues against the onslaught of free radicals that can lead to decay and disease.^{1,2}

WHAT YOU NEED TO KNOW: THE DISEASE-FIGHTING POWER OF BERRIES

- Many experts recognize that eating richly colored foods such as berries can have a significant impact on health.
- In general, the more deeply pigmented a fruit or vegetable is, the more nutritional value it has. In particular, deep pigments are a sign of the presence of powerful antioxidants known as anthocyanins.
- Deeply pigmented fruits and vegetables also possess powerful abilities to disarm dangerous free radicals, as indicated by their high ORAC values. USDA scientists

recommend obtaining 3,000-5,000 ORAC units each day—far more than what most individuals consume.

- Increasing consumption of high ORAC-value fruits and vegetables provides a simple yet powerful method of increasing the body’s defenses against disease-provoking free radicals.
- Anthocyanin-rich berry fruits have been shown to be active against some of today’s most common diseases, including cancer, cardiovascular disease, Alzheimer’s disease, and diabetes.
- Anthocyanins and other berry extracts have been shown to directly protect the blood vessels and the neurological system.
- Anthocyanins and other berry extracts have also been shown to have remarkable anti-aging effects, staving off the effects of free radical damage, which build up over time, causing disease.

Anthocyanins Fight Disease

One of nature’s most potent classes of flavonoids is the anthocyanins. These compounds have some of the highest ORAC values recorded among the compounds found in fruits and vegetables. They are responsible for the deep colors of berries, and as a rule of thumb, the more deeply colored your fruits and vegetables, the more nutrient-packed they are.



Worldwide, studies with anthocyanins and other compounds derived from berries and other fruits have demonstrated their benefits in fighting such conditions as cancer,³ diabetes,^{4,5} arthritis, and allergies by reducing inflammation.⁶ They are particularly effective at counteracting the effects of aging, showing benefits against several age-related diseases, particularly neurological disorders⁷ such as Alzheimer’s disease⁸ and macular degeneration (a leading cause of blindness in the elderly).⁹ Anthocyanin-rich fruit extracts also directly protect blood vessels,¹⁰ reduce blood pressure,¹¹ and lower cholesterol¹²—offering protection against cardiovascular disease.¹³ Some studies have even linked berry extract with protection against osteoporosis.¹⁴ The list starting on the next column reveals anthocyanin-rich foods and their major health benefits.

Nature’s most colorful fruits and vegetables provide powerful antioxidant benefits. Below is a list of antioxidant-rich foods, as measured by oxygen radical absorbance capacity (ORAC) value per 100 grams (about 3.5 ounces).^{2,110}

Fruits		Vegetables	
Pomegranate (juice)	2,860	Kale	1,770
Blueberries	2,400	Spinach	1,260
Strawberries	1,540	Brussels sprouts	980
Raspberries	1,220	Alfalfa sprouts	930
Plums	949	Broccoli florets	890
Oranges	750	Beets	840
Grapes, red	739	Red bell pepper	710
Cherries	670	Onion	450
		Corn	400
		Eggplant	390

Acai: This exotic South American fruit is a relatively new addition to the list of “functional foods.” Even at low doses, antioxidants from acai enter human cells and quench dangerous oxygen radicals.¹⁵



Studies using freeze-dried acai fruit pulp have shown it to have anti-inflammatory action—an important finding since inflammation underlies many chronic diseases of aging.¹⁵ A laboratory study also demonstrated the power of acai extracts to inhibit the growth and reproduction of leukemia cells.¹⁶

Aronia: This colorful fruit native to North America is found in red, black, and purple varieties. Studies of the antioxidant capacity of aronia berries have yielded some of the highest ORAC values ever recorded.¹⁷



Aronia extracts have been shown to have a protective effect on the coronary arteries of pigs,¹⁰ to reduce experimentally induced inflammation of the eye,¹⁸ and inhibit biological markers of colon cancer¹⁹ in rats. Aronia juice has been shown to protect the liver²⁰ and defend against the development of gastric ulcers²¹ in rats. It can also help return blood levels of glucose and cholesterol to normal levels in rats suffering from diabetes.⁴

Bilberry: A close relative of **blueberries** and huckleberries, bilberries have traditionally been a favored treatment for ulcers, so it is no surprise that they stimulate the increase of protective mucus in the stomach.²² Several laboratory and rodent studies have also shown an effect of anthocyanin-rich bilberry extract against intestinal cancer cells.^{19,23,24}



In the laboratory, bilberry extract helps up-regulate enzymes that defend against oxidative stress in the eyes, suggesting it may be beneficial for guarding the eyes against age-related disorders, such as macular degeneration.²⁵

Blackcurrant: Move over oranges, the vitamin C content of black-currants has them beat.²⁶ In one intriguing study, taking blackcurrant extract improved volunteers’ ability to adapt to the dark and reduced symptoms of tired eyes.²⁷



Eating blackcurrants, along with lingonberries and bilberries, has been shown to reduce the susceptibility of low-density lipoprotein (LDL) to oxidative stress, which may confer important cardioprotective benefits.²⁸ Drinking blackcurrant juice helped improve the functioning of blood vessels²⁹ in rodents and helped older rats live longer.³⁰ Eating blackcurrant anthocyanins has also been shown to improve blood flow in the forearm in humans, suggesting it may help keep the vascular system healthy.³¹

Studies have linked blackcurrant juice and extracts with the ability to stop the growth of some harmful bacteria,^{32,33} and blackcurrant juice has been reported to help relieve the symptoms of urinary tract infections in the elderly.³⁴

Blackberry: These little black marvels demonstrate a wide array of health benefits. In the laboratory, blackberry extract helps induce the self-destruction of oral, breast, colon, and prostate cancer cells.³⁵ Blackberry extract also has significant antibacterial action.³³



Blackberries are particularly rich in the anthocyanin known as *cyanidin-3-O-beta-D-glucoside*, or *C3G*. C3G beats out many other tested anthocyanins in terms of ORAC values.^{36,37} In rats, it has been shown to prevent the formation of oxidative products caused by ultraviolet (UV) light,³⁸ protect the liver from free radical damage,^{39,40} reduce inflammation,⁴¹ and protect blood lipids against lipid peroxidation.⁴² C3G taken from blackberries has also been shown to have a protective effect on blood vessels.⁴³

Black Soybean Hull: This is another extremely rich source of the anthocyanin C3G.⁴⁴ Experimental findings show that black soybean helps protect human LDL against oxidation and might thus exert protective benefits against processes that lead to atherosclerosis.⁴⁵



Blueberry: These are not only little blue antioxidant powerhouses—wild blueberries are also a modest source of a healthy omega-3 called alpha-linolenic acid.⁴⁶



Studies suggest that a high-blueberry diet helps protect one of the body's most important blood vessels—the aorta.^{47,48}

Blueberry is particularly well known for its ability to protect against age-related deterioration of memory and brain function.⁴⁹⁻⁵¹

Blueberry even displays cancer-protective benefits. In the laboratory, blueberry induced the self-destruction of oral, breast, colon, and prostate cancer cells.³⁵

One study demonstrated the ability of blueberry to prevent bone loss in rats whose ovaries had been removed. These rats no longer produce female hormones, making them a useful animal model for human menopause.¹⁴

Blueberries in combination with probiotics have also demonstrated activity against colitis (inflammation of the large intestine)⁵² and liver injury⁵³ as well as action against parasites that may be culprits in diarrhea.⁵⁴

Blue Corn: Also known as purple corn, it is actually botanically the same as yellow corn, except that it also produces a particular anthocyanin that happens to be deep purple or blue in color. Blue corn has been shown to have as high or higher a concentration of anthocyanins than blueberries, known to be a superhero in the antioxidant world.⁵⁵ It is also high in C3G.



Rats on a high-fat diet fed purple corn pigment were less likely to develop early signs of obesity and diabetes than those on a high-fat diet not receiving this supplement.⁵⁶ It has also been shown to suppress the development of colon cancer cells in rats.⁵⁷

Cherry (sweet and tart): Cherries have traditionally been used to soothe arthritis and gout. According to research, they block the inflammatory pathways responsible for the pain associated with both of these conditions.⁵⁸⁻⁶⁰ Sweet cherries have also been shown to block inflammatory processes involved in heart disease.^{59,61}



Studies using whole tart cherry powder in rats prone to insulin resistance and abnormal blood lipid profiles have demonstrated its ability to reduce levels of triglycerides, cholesterol, glucose, and insulin in the blood, suggesting that adding cherries to the diet may help stave off both heart disease and diabetes. Tart cherry powder also reduced the amount of cholesterol stored in the liver.⁶² Extracts of anthocyanins from tart cherries have been shown to boost production of insulin in pancreatic cells taken from mice,⁶³ suggesting they may hold potential applications in managing diabetes.

Mice with a genetic susceptibility to developing colon cancer fed anthocyanins and cyanidin from cherries developed fewer tumors than those who did not receive the cherry-based supplement.⁶⁴ Cherries are also rich in a phytonutrient known as perillyl alcohol, which has been shown to prevent the development of or limit the progression of several types of cancer.⁶⁵⁻⁶⁸

Cranberry: This tart little berry has become famous for its ability to prevent urinary tract infections.⁶⁹ Scientists believe that cranberry works by preventing infectious *Escherichia coli* bacteria from adhering to the bladder wall, making it easier for them to be flushed out of the body.⁷⁰



Cranberry may also help to fight ulcers by preventing *Helicobacter pylori*, the bacterium implicated in peptic ulcers, from adhering to the stomach wall.^{71,72}

In the laboratory, cranberry extracts can inhibit the growth and proliferation of breast, prostate, colon, and lung cancer cells.⁷³

Scientists believe that beneficial compounds found in cranberries may help protect cardiovascular health via numerous mechanisms such as modulating blood pressure, inhibiting platelet aggregation, and lessening inflammation.⁷⁴

Elderberry: Traditionally used against colds and flu, there is indeed laboratory evidence that elderberry is active against the influenza virus. A study in humans showed that an elderberry extract could soothe the symptoms of the flu and shorten the duration of the illness.⁷⁵



One laboratory study demonstrated that anthocyanins taken from elderberries helped protect blood vessels from free radical damage, suggesting it could be beneficial against cardiovascular disease.¹⁰

Grape/Grape seed: Wine made from grapes has become famous for its health properties, which have largely been attributed to the presence of flavonoids, particularly quercetin and resveratrol. These compounds are believed to protect the heart by preventing the formation of dangerous clots⁷⁶ and preventing the oxidation of LDL, which is a crucial step in the development of atherosclerosis.^{77,78} Resveratrol has also been shown to protect heart muscle cells⁷⁹ and increase blood flow to the brain,



providing neuroprotection against the effects of stroke.⁸⁰

Grapes and compounds found in grapes have also been shown to lower cholesterol,^{81,82} help fight numerous cancers,^{83,84} and produce neuroprotective benefits.⁸⁵ They also have anti-inflammatory properties.⁸⁶

Grape seeds contain higher concentrations of many of the beneficial compounds found in grapes. In the laboratory, grape seed extract helped stop the growth of breast cancer and leukemia cells.⁸⁷⁻⁸⁹

Pomegranate: A heart-healthy fruit, pomegranate extracts have been shown to help safeguard arterial health. More remarkably, pomegranate juice reduced the presence of arterial plaque in a human study.⁹⁰ It has also been shown to reduce blood pressure in humans.¹¹



In the laboratory, pomegranate has inhibited the growth of aggressive forms of prostate cancer cells.⁹¹ Prostate cancer cells that were injected into mice grew less abundantly if the mice ate a pomegranate extract.⁹¹ In both mice and humans with prostate cancer, consuming pomegranate slowed the rising levels of prostate-specific antigen (PSA), which is a marker of disease progression.^{91,92} Pomegranate has also inhibited growth of colon cancer tumors in both the test tube and in mice⁹³⁻⁹⁵ and inhibited growth of lung⁹⁶ and breast cancer cells⁹⁷ in a test tube.

There is even evidence that pomegranate supports the skin's underlying structure, resulting in younger-looking skin.⁹⁸

Prune: Prunes, or dried plums, are a good source of beta carotene and potassium, in addition to antioxidants. Eating prunes and plums has also been shown to improve the body's ability to absorb iron.⁹⁹



In rats, eating prunes produced changes in the bowel that suggested they could be protective against colon cancer.¹⁰⁰ Consuming plum extract also reduced the blood levels of triglycerides, glucose, and insulin and increased insulin sensitivity in obese rats, suggesting they might be effective against type 2 diabetes.¹⁰¹

Finally, prunes have been shown to reduce bone loss among rats whose testes have been removed¹⁰² and improve indices of bone formation in postmenopausal women,¹⁰³ suggesting they may be effective against age-related osteoporosis.

Raspberry/Raspberry Seed: Lab-oratory studies have demonstrated the ability of raspberry and raspberry seed extracts to inhibit the growth of cancer cells, including oral, breast, prostate, cervical, and colon cancer cells.^{35,104,105} These little berries may exert their anticancer effects by acting as a rich source of ellagitannins. Present in both the red and black varieties of raspberries, ellagitannins are converted in the body to ellagic acid, ^{106,107} a well-known cancer-fighting antioxidant.



Strawberry: Exciting research suggests that strawberries are another great cancer fighter. In the laboratory, strawberry extracts have been shown to inhibit growth of liver, oral, breast, colon, and prostate cancer cells.^{35,108}



In a study where rats were artificially “aged” using radiation, a diet high in strawberries helped protect the animals from age-related deficits in learning and memory.⁵¹ In experimental studies, strawberries have also been found to reduce the formation of unwanted blood clots, which suggests they may be beneficial for preventing heart attacks and strokes.¹⁰⁹

Conclusion

Richly colored fruits and vegetables provide nature’s most abundant sources of disease-preventive compounds. By regularly consuming these nutritional powerhouses, you can help guard your cells against the daily onslaught of free radicals and fortify your body’s defenses against ailments ranging from cancer and cardiovascular disease to cognitive decline and macular degeneration.

If you have any questions on the scientific content of this article, please call a Life Extension Health Advisor at 1-800-226-2370.

The Importance of ORAC

Every second, each cell is bombarded with thousands of attacking free radicals. The damage these free radicals inflict is thought to underlie many of the chronic diseases associated with aging, such as neurodegenerative disease and cancer. Scientists believe that a crucial way to protect the brain and body against the effects of disease-provoking free radicals is to increase the consumption of foods possessing high ORAC values.

The oxygen radical absorbance capacity or ORAC value serves as a measure of the antioxidant value of a food, with higher ORAC values indicating a greater ability to disarm dangerous free radicals.²

Scientists from the United States Department of Agriculture now advise consuming between 3,000 to 5,000 ORAC units each day in order to maintain optimal antioxidant protection in the body’s tissues and plasma. Yet even those who consume five daily servings of typical fruits or vegetables typically only obtain about 2,000 ORAC units each day.^{1,2} The reason that many health-conscious adults fail to obtain sufficient antioxidant protection is that the most commonly consumed fruits and vegetables contain only modest antioxidant protection.

In order to meet the USDA’s ORAC recommendations, it is necessary to consume nutritional powerhouses like darkly colored berries. Simply adding one cup of **blueberries** to the diet provides a powerful 3,200 ORAC units. Other richly colored fruits and berries such as blackberries, raspberries, plums, and prunes similarly provide dramatic antioxidant protection for the entire body.^{1,2} Since these high-ORAC foods are seasonal, perishable, and often costly, nutritional supplements containing their extracts can help individuals capture their benefits year-round.

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