

Fruits, Vegetables and Healthy Aging

A Recap of the Role Phytonutrients Play in Maintaining Health

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Fruits, vegetables and botanicals have wide reaching implications for maintaining health. There is a clear pattern between plentiful intake of fruits and vegetables and reduced rates of a multitude of common illnesses, including heart attacks, cancer, strokes, diabetes, and hypertension. Furthermore, the polyphenols found in various fruits, vegetables and botanicals protect against the ulcer-causing bacterium *H. Pylori*, act as anti-inflammatories to reduce pain and support cognitive health.

Some scientists have suggested that we possess the ability to fend off a number of degenerative diseases based on our diets alone. For example, researchers have called cancer “a largely preventable disease” because it is highly susceptible to modulation by dietary factors. One group of researchers point out that phenolic compounds abundant in vegetables and fruits have been “described to play an important role as chemopreventive agents” but that “The current diet phenolic intake is often insufficient to protect from mutagens (either exogenous or endogenous), which leads to the need for dietary supplementation as an alternative approach.”¹

This article is a recap of research that depicts the number of ways fruits, vegetables and phytonutrients contribute to healthy aging.

Cardiovascular Support

Fruits, vegetables and their associated phytonutrients have been shown to play an important heart-protective role. Artichoke extracts, for example, have been shown to reduce total and LDL cholesterol and LDL oxidation, and improve endothelial function in humans with high cholesterol.² These effects are important because when LDL is oxidized it becomes even more harmful and endothelial dysfunction represents the first stage of cardiovascular disease.

Another example of a botanical that supports cardiovascular health is pomegranate juice. In a randomized, placebo-controlled, double-blind study of 45 patients who had ischemic coronary heart disease (CHD), daily consumption of pomegranate juice for 3 months resulted in a decrease of stress-induced ischemia. The control group, by contrast, experienced an increase.³

Other studies have shown that in addition to and independently from their antioxidant effects, plant polyphenols (1) enhance the production of factors that dilate blood vessels and inhibit the synthesis of factors that constrict blood vessels and (2) inhibit the expression in smooth muscle cells of two major factors (vascular endothelial growth factor and matrix metalloproteinase-2) that promote sticky platelets.⁴

High-Fat Meals

Ingestion of a high-fat meal impairs dilation of the brachial artery for at least 4 hours. Researchers randomized 38 healthy volunteers to receive one of three treatments for four weeks in conjunction with a high-fat meal. The first group received daily supplementation with both a powdered fruit/vegetable juice concentrate and a supplement providing antioxidants and herbal extracts. The second group received the juice concentrate alone. A third group received a matching placebo. When the fruit and vegetable juice concentrate was consumed combined with the antioxidant supplement and when the fruit/vegetable drink was administered alone, it blunted the detrimental effect of the high-fat meal. The placebo had no substantial effect. The fruit and vegetable drink also improved arterial dilation and increased nitric oxide concentrations, which takes on an anti-clotting

and anti-atherosclerotic role in the vascular system.⁵

Digestion

Phytonutrients are essential for our digestive tracts to function effectively. Parsley and cinnamon help to clean the digestive tract of *H. pylori* by stopping the ulcer-causing bacterium from adhering to stomach walls.⁶

Furthermore, in a number of studies, patients with indigestion who consumed artichoke extract experienced an improvement in their symptoms and an improved quality of life.⁷ Artichoke extract also resulted in a significant fall in irritable bowel syndrome incidence, a significant shift in self-reported usual bowel pattern away from “alternating constipation/diarrhea” toward “normal”, and a 41 percent reduction in symptoms.⁸

Cancer

Oxidative stress imposed by reactive oxygen species (ROS) plays a crucial role in the development of cancer, atherosclerosis, and neurodegenerative diseases. The ROS-induced development of cancer involves malignant transformation due to altered gene expression as well as DNA mutations. Considerable attention has been focused on identifying naturally occurring antioxidative phenolic phytochemicals able to decrease ROS levels.

Fruits and vegetables are widely researched for their ability to act as antimutagenic agents through their antioxidant actions. Various botanicals have acted as antimutagenics in a variety of cancers including colon, oral, lung, breast, esophageal, ovarian, gastric and prostate. Many phytonutrients induce apoptosis (cell death) and inhibit cancer cell proliferation.⁹

Epidemiologic studies suggest that high fruit and vegetable intake is associated with decreased risk of cancers of the upper digestive tract. One study of 345,904 subjects found that the more total fruits and vegetables consumed, the lower the cancer risk.¹⁰

Many phytonutrients are anti-carcinogenic due to their antioxidant and anti-inflammatory effects. Lutein extracted from marigold flowers, for example, is a strong free radical fighter shown to have an anti-mutagenic effect on cells in vitro. High dietary intake of lutein also has been associated with a reduced cancer risk.¹¹

Acerola cherry extract is another example of a plant compound with anti-cancer properties. In mice, acerola cherry regulated abnormal cell growth at the promotion stage of lung cancer.¹²

Phytonutrients also can protect the gastrointestinal tract from mutagens. When we cook food, especially meats, a carcinogenic compound known as N-nitrosamine is formed. Epicatechin, a flavanol found in green tea, can protect against N-nitrosamine formation and trigger the production of other compounds that inhibit cancer cell growth¹³ while apple juice can prevent oxidative damage to human colon cancer cells.¹⁴

Other botanicals, such as cruciferous vegetables, can favorably affect the way our body processes hormones, reducing the risk of breast and prostate cancer.¹⁵

Pain Reduction

While fruits and vegetables are known best for their heart-protective and anti-mutagenic actions, they also have been studied for other abilities. In one study, researchers tested orally administered anthocyanins extracted from tart cherries on the behavior of rats with induced inflammation. Tart cherry extracts reduced both edema and some of the negative effects associated with inflammation.¹⁶

Diabetes

Phytonutrients are also known for their antidiabetic actions. Green tea polyphenols and cinnamon both have a blood sugar stabilizing effect. In addition, administration of green tea polyphenols to normal rats increased glucose tolerance significantly, reduced lipid peroxidation, and increased liver glycogen content.¹⁷

Cognition

Studies have shown that various plant compounds play a role in cognitive health. Blueberries have reversed age-related deficits in neuronal signaling following eight weeks of feeding in animals. Polyphenolic compounds in blueberries cross the blood brain barrier and localize in various brain regions important for learning and memory.¹⁸

Conclusion

Fruit and vegetable intake is essential to support every aspect of our health. The need to nourish our bodies with a variety of phytonutrients indicates that everyone can benefit by supplementing his or her diet with an organic green drink.

References

1. Fresco P, Borges F, Diniz C, Marques MP. New insights on the anticancer properties of dietary polyphenols. *Med Res Rev.* 2006 May 18; [Epub ahead of print].
2. Lupattelli G, Marchesi S, Lombardini R, Roscini AR, Trinca F, Gemelli F, Vaudo G, Mannarino E. Artichoke juice improves endothelial function in hyperlipemia. *Life Sci.* 2004 Dec 31;76(7):775-82.
3. Sumner MD, Elliott-Eller M, Weidner G, Daubenmier JJ, Chew MH, Marlin R, Raisin CJ, Ornish D. Effects of pomegranate juice consumption on myocardial perfusion in patients with coronary heart disease. *Am J Cardiol.* 2005 Sep 15;96(6):810-4.
4. Stoclet JC, Chataigneau T, Ndiaye M, Oak MH, El Bedoui J, Chataigneau M, Schini-Kerth VB. Vascular protection by dietary polyphenols. *Eur J Pharmacol.* 2004 Oct 1;500(1-3):299-313.
5. Plotnick GD, Corretti MC, Vogel RA, Hesslink R Jr, Wise JA. Effect of supplemental phytonutrients on impairment of the flow-mediated brachial artery vasoactivity after a single high-fat meal. *J Am Coll Cardiol.* 2003 May 21;41(10):1744-9.
6. O'Mahony R, Al-Khtheeri H, Weerasekera D, Fernando N, Vaira D, Holton J, Basset C. Bactericidal and anti-adhesive properties of culinary and medicinal plants against *Helicobacter pylori*. *World J Gastroenterol.* 2005 Dec 21;11(47):7499-507.
7. Holtmann G, Adam B, Haag S, Collet W, Grunewald E, Windeck T. Efficacy of artichoke leaf extract in the treatment of patients with functional dyspepsia: a six-week placebo-controlled, double-blind, multicentre trial. *Aliment Pharmacol Ther.* 2003 Dec;18(11-12):1099-105.
8. Adams LS, Seeram NP, Aggarwal BB, Takada Y, Sand D, Heber D, Bundy R, Walker AF, Middleton RW, Marakis G, Booth JC. Artichoke leaf extract reduces symptoms of irritable bowel syndrome and improves quality of life in otherwise healthy volunteers suffering from concomitant dyspepsia: a subset analysis. *J Altern Complement Med.* 2004 Aug;10(4):667-9.
9. Adams LS, Seeram NP, Aggarwal BB, Takada Y, Sand D, Heber D. Pomegranate juice, total pomegranate ellagitannins, and punicalagin suppress inflammatory cell signaling in colon cancer cells. *J Agric Food Chem.* 2006 Feb 8;54(3):980-5
10. Boeing H, Dietrich T, Hoffmann K, Pischon T, Ferrari P, Lahmann PH, Boutron-Ruault MC, Clavel-Chapelon F, Allen N, Key T, Skeie G, Lund E, Olsen A, Tjonneland A, Overvad K, Jensen MK, Rohrmann S, et al. Intake of fruits and vegetables and risk of cancer of the upper aero-digestive tract: the prospective EPIC-study. *Cancer Causes Control.* 2006 Sep;17(7):957-69.
11. Wang M, Tsao R, Zhang S, Dong Z, Yang R, Gong J, Pei Y. Antioxidant activity, mutagenicity/anti-mutagenicity, and clastogenicity/anti-clastogenicity of lutein from marigold flowers. *Food Chem Toxicol.* 2006 Sep;44(9):1522-9.
12. Nagamine I, Akiyama T, Kainuma M, Kumagai H, Satoh H, Yamada K, Yano T, Sakurai H. Effect of acerola cherry extract on cell proliferation and activation of ras signal pathway at the promotion stage of lung tumorigenesis in mice. *J Nutr Sci Vitaminol (Tokyo).* 2002 Feb;48(1):69-72.

13. Lee SY, Munerol B, Pollard S, Youdim KA, Pannala AS, Kuhnle GG, Debnam ES, Rice-Evans C, Spencer JP. The reaction of flavanols with nitrous acid protects against N-nitrosamine formation and leads to the formation of nitroso derivatives which inhibit cancer cell growth. *Free Radic Biol Med*. 2006 Jan 15;40(2):323-34.
14. Schaefer S, Baum M, Eisenbrand G, Janzowski C. Modulation of oxidative cell damage by reconstituted mixtures of phenolic apple juice extracts in human colon cell lines. *Mol Nutr Food Res*. 2006 Apr;50(4-5):413-7.
15. Moreno DA, Carvajal M, Lopez-Berenguer C, Garcia-Viguera C. Chemical and biological characterisation of nutraceutical compounds of broccoli. *J Pharm Biomed Anal*. 2006 May 17; [Epub ahead of print]
16. Tall JM, Seeram NP, Zhao C, Nair MG, Meyer RA, Raja SN. Tart cherry anthocyanins suppress inflammation-induced pain behavior in rat. *Behav Brain Res*. 2004 Aug 12;153(1):181-8.
17. M C S, K S, Kuttan R. Anti-diabetic activity of green tea polyphenols and their role in reducing oxidative stress in experimental diabetes. *J Ethnopharmacol*. 2002 Nov;83(1-2):109-16.
18. Andres-Lacueva C, Shukitt-Hale B, Galli RL, Jauregui O, Lamuela-Raventos RM, Joseph JA. Anthocyanins in aged blueberry-fed rats are found centrally and may enhance memory. *Nutr Neurosci*. 2005 Apr;8(2):111-20.