

Message: naturally colorful foods are good for your health...Editor, AJFAND

American Institute for Cancer Research(AICR) writes:

Flavonoids for Cancer Prevention: A Closer Look



What do blueberries, black tea, oranges, and parsley all have in common? Besides being edible and fragrant, they all contain high amounts of flavonoids, a group of phytochemicals well studied for their link to fighting cancer. Plants are teeming with flavonoids, and humans consume a lot of them.

Over the last two decades, lab and epidemiological studies have suggested that consuming high amounts of flavonoids may reduce the risk of breast, colon, lung, prostate and pancreatic cancers, but many studies are inconclusive or conflicting. Now a new overview of the research, supported by AICR, provides new insight on flavonoids and cancer protection.

“In general...there’s evidence that many flavonoids have a protective effect against cancer,” says Donato Romagnolo, PhD, a Professor of Nutritional Sciences and Cancer Biology at the University of Arizona Cancer Center who recently co-authored a review of the evidence on flavonoids and cancer prevention. “Yet there is huge confusion on the potential effects of this class of food components on cancer risk and the review literature suggests that we are still wrestling with this issue.”

Romagnolo’s review, published in the *Journal of Nutrition in Gerontology and Geriatrics*, found that the strongest evidence for dietary flavonoids reducing cancer risk was for cancers of the colorectum and breast. This may be, in part, because these sites also make up the majority of the flavonoid-cancer research; there are fewer studies, but still many, on pancreatic, liver and lung cancers.

Researchers have now identified thousands of flavonoids. All are structurally similar, containing a ring of six carbon and hydrogen atoms – called a benzene ring. There are six flavonoid subclasses, including anthocyanidins, flavon-3-ols, and flavones, with each contain hundreds of

compounds within them. The wide variety gives this group a diverse array of biological activities.

Flavonoids act as antioxidants in our diets and are also responsible for the beautiful colors in our foods – from the red in pomegranates to the orange in apricots. Major dietary sources of flavonoids include fruits, vegetables and tea. In the United States, about 85 percent of our flavonoids come from the flavan-3-ols, which are found in tea, apples, cocoa, notes Romagnolo.

Commonly recognized flavonoids include quercetin, found in onions and tea; catechins, found in tea and cocoa; and genistein, found in soybeans.

For the review, Romagnolo identified approximately 80 human studies related to flavonoids and cancer published from 2005 onwards. It is only in the past decade, with the development of the USDA database on flavonoids, that studies began to more accurately quantify the consumption of flavonoids. “There’s been an active effort to improve how we estimate flavonoid intake,” said Romagnolo.

Highlights of his findings include:

- It is likely that specific flavonoids reduce the risk of specific cancers. For example, a US study found no association between risk of ovarian cancer and total flavonoid intake, but it found a decreased risk linked to dietary intake of apigenin, a flavone commonly found in celery.
- Certain flavonoids act specifically on hormone-related cancers. Flavonoids that are phytoestrogens, compounds that acts as a weak form of estrogen, affect tumors regulated by hormones, says Romagnolo, such as breast, prostate, and ovary. Genistein, for example, is a phytoestrogen found in soy.
- For breast cancer, the age you start consuming flavonoids may influence later cancer risk. Research points to a lower reduced risk of premenopausal breast cancer linked to consuming soy and its isoflavones in adolescence, compared to when consumed later in life.
- The mechanisms involved in flavonoids and cancer protection are complex. Flavonoids will inhibit processes that induce cancer such as proliferation, inflammation and angiogenesis. “There are many molecular targets so we can’t pinpoint a specific one. There are cascades and multiple pathways that overlap,” adds Romagnolo.

Part of the reason for conflicting data on flavonoids may be due to questions on flavonoid intake and if the same compound affects people of different genders and ethnicities. Smoking may also alter how or if flavonoids provide cancer protection, says Romagnolo.

“We still have a lot of questions concerning the mechanism of action and whether or not physiologically relevant doses in humans will or will not have a protective effect, says Romagnolo. In order to answer these questions, we need to have preclinical studies with physiologically relevant doses and randomized controlled trials with large sample sizes.”

For now, according to Romagnolo and AICR experts, there is no downside to eating a diet packed with flavonoids.

As the research continues to uncover which flavonoids link to reduced risk of what cancers, one way to make sure you're getting a wide variety is by choosing an array of colorful vegetables, fruits, and beans, according to AICR Registered Dietitian Alice Bender. "Not only do you get a lot of nutrients and phytochemicals such as flavonoids, you also get foods that help promote a healthy weight and protect against cancer."

Source: Romagnolo DF and Selmin OI. (2012): [Flavonoids and Cancer Prevention: A Review of the Evidence](http://dx.doi.org/10.1080/21551197.2012.702534), Journal of Nutrition in Gerontology and Geriatrics, 31:3, 206-238. <http://dx.doi.org/10.1080/21551197.2012.702534>

Published on December 5, 2012