Nutrition and Heath Infor Sheet

Produced by Karrie Heneman, PhD, Sheri Zidenberg-Cherr, PhD, UC Cooperative Extension Center for Health and Nutrition Research Department of Nutrition University of California Davis, CA 95616-8669 October 2008

Some Facts About Flavonols

What are flavonols?

Flavonols are phytochemical compounds found in a variety of plant based foods including apples, apricots, beans, broad beans, broccoli, cherry tomatoes, chives, cranberries, kale, leeks, pear, onions, red grapes, sweet cherries, and white currants (1).



Are there beneficial effects associated with consumption of flavonols?

Consumption of flavonols, such as quercitin, kaempferol, and myricetin, has been associated with a variety of beneficial effects including a reduced risk of cancer and cardiovascular disease (2).

There is a lot of media hype around apples, broccoli, and cranberries. Are these really "super foods"?

• Apples



- Research has found that consumption of apples reduced risk of oral, pharynx, esophagus, colon, larynx, breast, ovary and prostate cancer (3); cardiovascular disease, cardiovascular events, coronary mortality, and thrombotic stroke (4); asthma, bronchial sensitivity, and chronic obstructive pulmonary disease (4); and type 2 diabetes (5).
- In light of these findings, consuming an apple a day as part of your daily recommended intake of a variety of fruits and vegetables may be beneficial to overall health.
- Broccoli
 - Current research suggests that consumption of broccoli is associated with a reduced risk of breast (6), prostate (7), bladder (8), lung, colon, thyroid, and stomach cancer in addition to cancer of the respiratory tract and reproductive organs (9).



- *Conclusions:* In light of this research, the American Cancer Society recommends consuming broccoli as part of a balanced diet that includes foods from a variety of plant sources.
- Cranberries
 - Current scientific evidence suggests that consumption of cranberry products can prevent new urinary tract infections (10) and reduce risk of cardiovascular disease (11).



Conclusions: The Dietary Guidelines for Americans, 2005 recommends limiting consumption of juice to ensure adequate intake of fiber (31g/ 2000 kcals). For women prone to urinary tract infections, consuming $\frac{1}{2}$ cup of cranberry juice daily may help to reduce the number of new infections.

REFERENCES:

- 1. Aherne SA, and O'Brien NM. Dietary flavonols: chemistry, food content, and metabolism. *Nutrition*; 2002; 18: 75-81.
- 2. Williamson G, and Manach C. Bioavailability and bioefficacy of polyphenols in humans. II. Review of 93 intervention studies. *Am J Clin Nutr*, 2005; 81: 243S-255S.
- 3. Gallus S, et al. Does an apple a day keep the oncologist away? Ann Oncol; 2005; 16: 1841-4.
- 4. Boyer J, and Liu RH. Apple phytochemicals and their health benefits. *Nutr J*; 2004; 3: 5.
- 5. Song Y, et al. Associations of dietary flavonoids with risk of type 2 diabetes, and markers of insulin resistance and systemic inflammation in women: a prospective study and cross-sectional analysis. J *Am Coll Nutr*, 2005; 24: 376-84.
- 6. Ambrosone CB, et al. Breast cancer risk in premenopausal women is inversely associated with consumption of broccoli, a source of isothiocyanates, but is not modified by GST genotype. *J Nutr*; 2004; 134: 1134-8.
- 7. Kirsh VA, et al. Prospective study of fruit and vegetable intake and risk of prostate cancer. *J Natl Cancer Inst*; 2007; 99: 1200-9.
- 8. Michaud DS, et al. Fruit and vegetable intake and incidence of bladder cancer in a male prospective cohort. J Natl Cancer Inst; 1999; 91: 605-13.
- 9. Verhoeven DT, et al. Epidemiological studies on brassica vegetables and cancer risk. *Cancer Epidemiol Biomarkers Prev*; 1996; 5: 733-48.
- 10. Jepson RG, and Craig JC. A systematic review of the evidence for cranberries and blueberries in UTI prevention. *Mol Nutr Food Res*; 2007; 51: 738-45.
- 11. Ruel G, et al. Changes in plasma antioxidant capacity and oxidized low-density lipoprotein levels in men after short-term cranberry juice consumption. *Metabolism*; 2005; 54: 856-61.

* Production of this material was supported by a grant from the Vitamin Cases Consumer Settlement Fund, created as a result of an antitrust class action. One of the purposes of the fund is to improve the health and nutrition of California consumers.

The University of California prohibits discrimination or harassment of any person on the basis of race, color, national origin, religion, sex, gender identity, pregnancy (including childbirth, and medical conditions related to pregnancy or childbirth), physical or mental disability, medical condition (cancer-related or genetic characteristics), ancestry, marital status, age, sexual orientation, citizenship, or service in the uniformed services (as defined by the Uniformed Services Employment and Reemployment Rights Act of 1994: service in the uniformed services includes membership, application for membership, performance of service, application for service, or obligation for service in the uniformed services) in any of its programs or activities.

University policy also prohibits reprisal or retaliation against any person in any of its programs or activities for making a complaint of discrimination or sexual harassment or for using or participating in the investigation or resolution process of any such complaint.

University policy is intended to be consistent with the provisions of applicable State and Federal laws.

Inquiries regarding the University's nondiscrimination policies may be directed to the Affirmative Action/Equal Opportunity Director, University of California, Agriculture and Natural Resources, 1111 Franklin Street, 6th Floor, Oakland, CA 94607, (510) 987-0096.