Table 3. Effects of Blueberries on Nitric Oxide Levels

	Nitric Oxide (μM)	
	Blueberry	Control
Baseline	9.11	9.81
4 week	13.86	9.20
8 week	15.35[a]	10.73

[a]Significant difference ($p < .05$) compared with baseline.

Daily consumption of blueberry powder for 8 weeks significantly reduced systolic and diastolic BP (Table 1) and brachial-ankle PWV (Table 2). Also, NO production was significantly elevated at 8 weeks in those whose daily diet included the blueberry powder (Table 3).

While noting that these results need to confirmed in a larger study, the researchers concluded that blueberry ingestion may result in increased NO production by endothelial cells, which may directly result in vasodilation and reductions in BP. Moving forward, further study is needed to assess the influence of dose on BP response and the effects of blueberry powder over more prolonged periods and in other populations.

Study Results Suggest That Flavones and Flavan-3-ols Protect Against Breast Cancer

Written by Toni Rizzo

Consumption of fruits, vegetables, and carotenoids has been shown to reduce the risk of breast cancer, in particular estrogen-negative (ER−) breast cancer [Jung S et al. *J Natl Cancer Inst* 2013; Aune D et al. *Breast Cancer Res Treat* 2012; Eliassen AH et al. *J Natl Cancer Inst* 2012; Zhang X et al. *Am J Clin Nutr* 2012]. Fruits and vegetables are rich in flavonoids, which are potential anticancer agents. Flavonoids have antioxidant, anti-inflammatory, anti-proliferative, and pro-apoptotic effects. A recent meta-analysis reported that flavonols and flavones, but not other flavonoid subclasses, were associated with a decreased risk of breast cancer, especially in postmenopausal women [Chang H et al. *PloS ONE* 2013].

Most previous studies have focused on the association between 1 or 2 subclasses of flavonoids, and no studies have investigated proanthocyanidins. Furthermore, only 3 studies have stratified subjects by the ER status of the breast cancer. The objective of the Cancer Prevention Study II [CPS-II] Nutrition Cohort, presented by Ying Wang, PhD, Epidemiology Research Program, American Cancer Society, Atlanta, Georgia, USA, was to evaluate the association of several flavonoids on the risk of invasive breast cancer in women stratified by ER status.

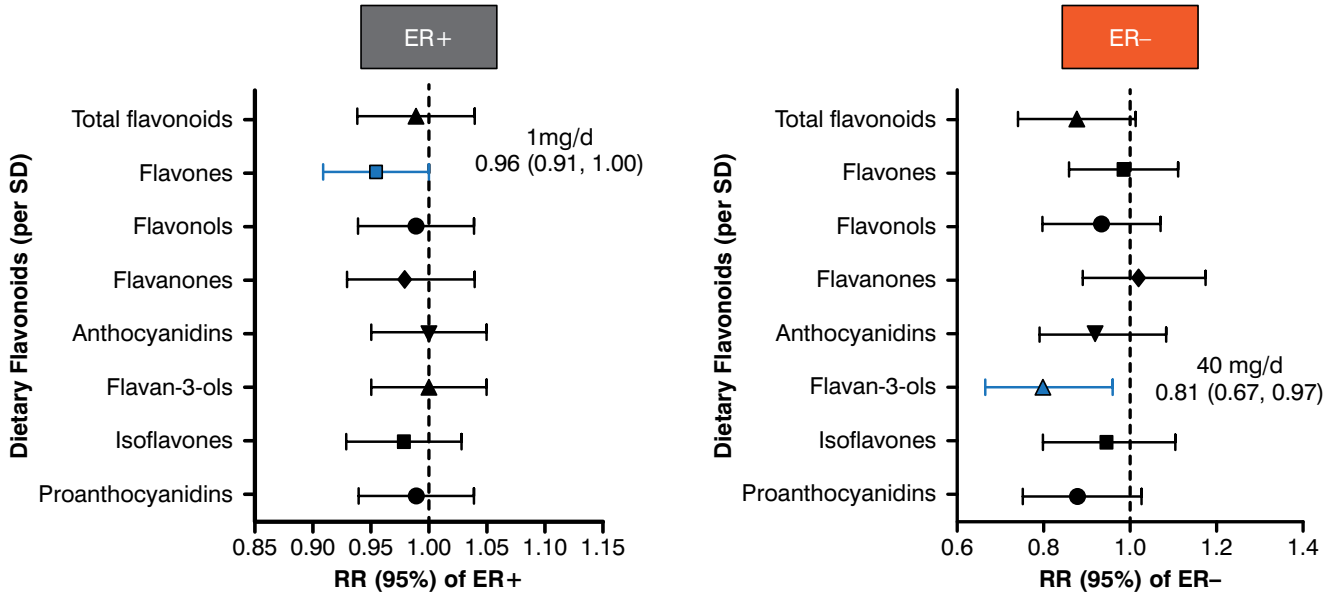
The study population included 73,640 women who returned a modified Willett food frequency questionnaire. A total of 56,630 postmenopausal women were included in the analysis after 1752 were lost to follow-up. Women previously diagnosed with cancer and those women who reported energy intake that was outside the acceptable range were excluded from the analysis. The women were followed until they developed breast cancer, they died, the last survey was returned, or June 30, 2009.

At a mean follow-up of 8.5 years, 2116 cases of invasive breast cancer, including 1498 ER+ and 218 ER− cancers, were diagnosed. Flavonoid exposure was assessed with the food frequency questionnaire; information from the USDA flavonoid, proanthocynanidin, and isoflavone databases; and scientific publications. The flavonoids assessed included flavones, flavonols, flavanones, anthocyanidins, flavan3ols, isoflavones, and proanthocyanidins. The women were categorized into quintiles of flavonoid intake. The median intake and range (mg/day) of total flavonoids for each quintile (Q) were Q1 = 9.5 (≤ 118.7); Q2 = 143.7 (> 118.7 to 171.0); Q3 = 201.4 (> 171.0 to 239.2); Q4 = 288.6 (> 239.2 to 363.8); and Q5 = 522.9 (> 363.8 to 2062.8). The mean age ranged from 68.4 to 68.9 years in each quintile, and ~ 98% of the women in each quintile were white.

The intake of flavones, but not other flavonoids, was inversely associated with total invasive breast cancer risk when evaluated by quintiles (p value for trend = .04) and continuous exposure (RR, 0.96; 95% CI, 0.92 to 1.00). When evaluated by quintiles, intake of no flavonoids was associated with ER+ or ER− breast cancer risk. When evaluated by continuous exposure, flavones intake was inversely associated with ER+ breast cancer risk (RR, 0.96; 95% CI, 0.91 to 1.00), and flavan-3-ol intake was inversely associated with ER− breast cancer risk (RR, 0.81; 95% CI, 0.67 to 0.97; Figure 1).

Dr. Wang concluded that these findings are consistent with the results of other research. The results suggest that

Figure 1. Flavonoid Association With Breast Cancer Risk by ER Status



ER=estrogen receptor; SD=standard deviation.

The increments are 220 mg/d for total flavonoids, 10 mg/d for anthocyanidins, 40 mg/d for flavan-3-ols, 20 mg/d for flavanones, 1 mg/d for flavones, 10 mg/d for flavonols, 3 mg/d for isoflavones, and 170 mg/d for proanthocyanidins.

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plant-based diets have a protective role against breast cancer. Future pooled analyses of large cohort studies are warranted to confirm these findings.

Vegetable Oil Can Improve High-Density Lipoprotein Function

Written by Brian Hoyle

Researchers from Canada and the United States have shown that diets low in saturated fatty acids and high in unsaturated fatty acids, including monounsaturated and polyunsaturated fatty acids, all similarly reduce high-density lipoprotein cholesterol (HDL-C), which is associated with reduced obesity by boosting the efflux of cholesterol. The findings were presented by Xiaoran Liu, PhD candidate, Pennsylvania State University, University Park, Pennsylvania, USA.

HDL-C concentration has been inversely associated with the risk of cardiovascular disease in epidemiologic studies. But this relationship has not been evident in clinical trials, suggesting that HDL-C function, rather than concentration, may be the important factor [Rosensen RS et al. *Circulation* 2013]. In the arterial wall, lipid-laden macrophages drive the formation of atherosclerotic plaques, while HDL can promote the efflux and subsequent washing away of cholesterol [Rader DJ, Puré E. *Cell Metabol* 2005].

The Canola Oil Multicentre Intervention Trial [COMIT; NCT01233778] was undertaken in part to assess the effects of various edible oils on cardiovascular health in subjects with risk factors for metabolic syndrome. Specifically, COMIT assessed the effects of the selected oils on the efflux of cholesterol and the relationship with visceral adiposity.

The 101 participants (49 men, 52 women) satisfied the following eligibility criteria: age, 20 to 65 years; waist circumference ≥90 cm (men) and ≥80 cm (women); and at least 1 of the established metabolic risk factors of metabolic syndrome: elevated blood glucose, HDL-C, triglycerides, or blood pressure ≥130/85. Subjects were not taking cholesterol- or glucose-lowering medications. Blood pressure medications were permitted.

The participants consumed diets elevated in canola oil, high oleic canola, high oleic canola supplemented with docosahexaenoic acid (DHA), corn/safflower, and flax/safflower (Table 1). The order of each 4-week diet was randomized. There was a 2- to 4-week washout period in between each diet. The efflux of cholesterol from THP-1 macrophages was measured by an in vitro fluorescence