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File: ■ Blueberry (*Vaccinium angustifolium*)

- Memory
- Elderly

HC 101053-415

Date: December 31, 2010

RE: Preliminary Clinical Trial Suggests that Blueberry Juice Consumption May Slow Memory Impairment and Cognitive Decline Associated with Aging

Krikorian R, Shidler MD, Nash TA, et al. Blueberry supplementation improves memory in older adults. *J Agric Food Chem.* 2010;58(7):3996-4000.

People with mild cognitive impairment are at increased risk of developing Alzheimer's disease (AD) and other types of dementia. There is no effective treatment for AD, but treatment at the stage of mild cognitive impairment could potentially slow the development and progression to AD. Dietary intervention reduces the risk for cardiovascular disease and diabetes, and increased consumption of fruits and vegetables is associated with better cognitive performance in elderly people. Blueberry (*Vaccinium angustifolium*) supplementation is reported to enhance memory and improve metabolic function in aging animals, effects which are attributed to anthocyanins in the fruit. The purpose of this single-blind pilot study was to investigate the neurocognitive effects of blueberry juice in older adults with mild cognitive impairment.

The trial was conducted at the University of Cincinnati in Cincinnati, Ohio. Older men and women with mild age-related memory decline were eligible for the trial if they did not have diabetes, psychiatric conditions, or neurological conditions other than mild cognitive impairment. The subjects were told that they would get grape juice, blueberry juice, or a berry flavored placebo drink during the study, but all subjects received blueberry juice. The blueberry juice was prepared from frozen wild lowbush blueberries by Van Dyk's Health Juice Products Ltd. (Caledonia, Nova Scotia, Canada). The ripe berries were thawed and pressed, and the juice was then filtered, pasteurized, and bottled.

The subjects were instructed to drink the juice 3 times a day with meals for 12 weeks. The volume of juice ranged from 444 ml to 621 ml daily, depending on body weight. This volume of juice provided from 428 mg to 598 mg of anthocyanins. Subjects were instructed to avoid eating berries and drinking berry juices and wine during the study. Memory function was measured using the Verbal Paired Associate Learning Test and the California Verbal Learning Test, and mood was measured using the Geriatric Depression Scale. Memory and mood were assessed at baseline and after 12 weeks.

Fasting blood samples were collected, and body weight and waist circumference were measured at both visits.

The trial enrolled 4 women and 5 men, and all 9 subjects completed the trial. The mean age was 76.2 years, the mean educational level was 15.6 years, and scores on the depression scale were in the normal range. Memory scores on the Verbal Paired Associate Learning Test improved significantly ($P = 0.009$), and scores on the California Verbal Learning Test improved significantly ($P = 0.04$) from baseline to 12 weeks. Unfortunately, the effects of practice cannot be eliminated since these are before and after comparisons. Improvements in depression scores, fasting glucose levels, and fasting insulin levels were found after 12 weeks, but these changes were not statistically significant.

Results from this group of subjects were compared with those of a control group from a similar study. In this control group, 7 subjects drank similar amounts of a placebo beverage for 12 weeks. There were no significant differences in age or educational level between the 2 groups. Compared to the control group, memory scores improved significantly ($P = 0.03$) on the Verbal Paired Associate Learning Test but not on the California Verbal Learning Test.

This is the first published trial examining the neurocognitive effects of blueberry juice in adults at risk for dementia. In this trial, blueberry juice appeared to improve memory function in older adults with early memory impairment. The authors suggest that blueberries may be useful in delaying the memory impairment and cognitive decline associated with aging. Although the improvement in depression symptoms was not significant, this trend further supports the neurocognitive effects of blueberry supplementation. Anthocyanins in blueberries and other fruits have known antioxidant and anti-inflammatory properties, and the nonsignificant improvements in fasting glucose and insulin levels seen in this study suggest additional metabolic effects.

Limitations of this study include the very small sample size, the lack of an internal control group, and the lack of a matching placebo for the blueberry juice. This pilot study provides the basis for conducting larger controlled clinical trials to further study metabolic and cognitive effects of blueberry supplementation and evaluate the potential benefits of supplementation on age-related health conditions.

—Heather S. Oliff, PhD

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