Blueberries are a healthy fruit: at only 80 calories per cup, they are virtually fat-free and serve as a good source of fiber and vitamin C. Investigators are currently pursuing five tracks to better understand the role that blueberries may play in promoting good health – cardiovascular health, insulin response, brain health, cancer research and the gut microbiome. Research into the gut microbiome is still in early stages, however investigations in the other areas continue to advance.

Cardiovascular Health
Cardiovascular disease is a major public health concern in the United States, and currently the leading cause of death for both men and women. Conditions that in combination significantly increase an individual’s risk for developing cardiovascular disease include high blood sugar, high blood pressure, obesity and high blood-lipid levels. The name given to this cluster of symptoms is metabolic syndrome.

In a study of 48 obese human subjects with metabolic syndrome, those who consumed a blueberry beverage daily over an eight-week period experienced a decrease in their systolic and diastolic blood pressure compared to those who consumed a placebo beverage. During the study, participants maintained their usual diets and physical activity patterns, but were asked to avoid consuming flavonoid-rich foods such as any other berries, green tea, cocoa and soy. The results warrant further investigation and provide some evidence for including blueberries as part of healthy dietary practices.

A recent human study out of Florida State University investigated the effects of blueberry consumption on 40 postmenopausal women with pre- and stage 1 hypertension. The results found that the participants who consumed blueberry powder experienced a reduction in blood pressure and arterial stiffness, a measure of cardiovascular disease risk. Nitric oxide levels were also greater in participants who consumed blueberry powder. Conducted over an eight-week period, the participants were advised to maintain their usual diet and physical activity levels during the duration of the study. While more research is needed, this initial study provides insight on the role that blueberries may play in the area of blood pressure and cardiovascular health.

In another human study, 44 adults with metabolic syndrome who consumed a blueberry or placebo smoothie twice daily for six weeks exhibited a significant improvement in vascular endothelial function. There was not a significant change in blood pressure, however many of these subjects were on antihypertensive medications which may have masked any effect from the blueberries. There was also no difference in insulin sensitivity between the blueberry and placebo groups. Although more trials are needed, this study does suggest a favorable benefit of blueberries on vascular health over a six-week period in adults with metabolic syndrome.

Clinical trials with a longer duration are warranted to explain the potential role in improving endothelial function and blood pressure in a population at high risk for developing cardiovascular disease.

Insulin Response
According to the American Diabetes Association, insulin resistance is a condition in which cells do not fully respond to the action of insulin, a hormone that regulates blood glucose. As a result, cellular uptake of glucose is impaired and blood glucose levels become abnormally high. Insulin resistance is commonly seen in obese individuals and can lead to Type 2 or adult-onset diabetes, the most common form of diabetes in the United States which continues to rise at a rapid rate.

While more research is needed to understand the effects on humans, studies with animals suggest that blueberries may have an effect on the way insulin does its job. In one animal study conducted at the USDA research center at Tufts University, obese mice were given high-fat diets with or without blueberries for eight weeks. The results yielded an improved insulin response with lower blood glucose levels in the blueberry-fed mice than in the controls.
Insulin Response (continued)

In another study at the University of Michigan, researchers gave obese rats either a low- or high-fat diet supplemented with 2 percent blueberries and tested the effects against the control group. After 90 days, the rats that received the blueberry-enriched diet had increased insulin sensitivity, decreased blood lipid levels and measurably less abdominal fat. These results were also seen in the group that received the low-fat diet supplemented with blueberries.6

In a human clinical trial, 32 individuals who were already diagnosed with metabolic syndrome were given similarly tasting smoothies, but either with or without blueberries twice daily for six weeks. The researchers found that those who consumed blueberries were more able to lower their blood glucose in response to insulin than those who were not given blueberries.6 While the study is not conclusive, it strongly suggests that more research is needed to evaluate blueberries and their potential role in improving insulin sensitivity in an insulin-resistant population.

Epidemiological studies that have looked at the diets of large groups of people, such as the Nurses’ Health Study and the Health Professionals Follow-Up Study, over a long period of time have shown that a high intake of fruit, particularly fruits high in anthocyanins such as blueberries, is associated with a decreased risk of developing Type 2 diabetes. It is possible that these findings reflect other dietary components that co-exist in anthocyanin-rich foods, and randomized trials will be needed to establish the effects that can be specifically attributed to anthocyanins. Further research on anthocyanin-rich foods may lead to more specific recommendations on consumption of fruit, which may contribute to the prevention of Type 2 diabetes.10,11

Brain Health

Scientists at the USDA research center at Tufts University have been studying the beneficial effects of blueberries on brain function in animal models for over a decade, and are now testing the effects on humans. In a recent human study on healthy men (13) and women (24), between the ages of 60 and 75 who were randomly selected to receive a diet supplemented daily with blueberries or a placebo for 90 days.

The results found that the blueberry-supplemented group showed significantly fewer errors compared to the placebo group in tests used to assess verbal memory and task switching. There was no improvement in mobility in either the blueberry or the placebo group. While more evidence is needed, results of this study add to the body of research on blueberry-supplemented diets and positive outcomes in cell and animal research on age-related cognitive decline.12

Animal studies on middle-aged mice that were fed a high-fat diet showed memory deficits as measured by a novel object recognition test. However, supplementing the diet with blueberries reduced the memory deficits and indices of microglia activation, and increased neuroplasticity of the mice. The study is a first step in determining if incorporating more nutrient-dense foods into a high-fat diet can alter cognitive dysfunction.13,14

Robert Krikorian and his team at the University of Cincinnati investigated the effects of a blueberry-supplemented diet on 16 older adults with mild cognitive impairment. The study assessed changes in regional brain activation during a working memory test. The participants that consumed the blueberry-supplemented diet exhibited increased BOLD (blood oxygen level-dependent) activation in certain parts of the brain, revealed by magnetic resonance imaging (MRI).15 There was no clear indication of working memory enhancement associated with blueberry supplementation.

Cancer

Scientists are just beginning to understand the complicated relationship between diet and cancer. According to researchers at the City of Hope National Medical Center, blueberries may have an effect on breast cancer cell growth. Three studies have demonstrated that both breast tumor growth and the spread of the cancer can be reduced in blueberry-supplemented mice.16-18 In addition, a recent study showed that feeding rats a blueberry-supplemented diet reduced tumor growth even when feeding began after the tumors were present.19 These studies are not conclusive for humans and more research is needed in the area of cancer and blueberry intake.

REFERENCES:


6. The American Diabetes Association. Type 2 Diabetes Facts. Available at: http://diabetes.bsd.uchicago.edu/facts-type2-


