

Blueberries and Antioxidants

For centuries, people have enjoyed blueberries for their flavor and color. In a new research study, animals fed a blueberry extract diet, rich in naturally-derived antioxidants, showed fewer age-related motor changes and outperformed their study counterparts on memory tests. Indeed, blueberries and other foods containing antioxidants may act to protect the body against damage from oxidative stress, one of several biological processes implicated in aging and in the development of a number of neurodegenerative diseases. The National Institute on Aging (NIA) and the U.S. Department of Agriculture funded the study.

In the study, three groups of older rats were fed an 9-week-long diet supplemented with fruit or vegetable extracts with potential antioxidant effects. A fourth group of animals did not receive the special diet. The group of animals that received the supplements showed some improvement on key indicators of age-related decline.

The study was conducted by James Joseph Ph.D. of the U.S. Department of Agriculture, Human Nutrition Research Center on Aging at Tufts University in Boston, and Paula C. Bickford, Ph.D. of the University of Colorado Health Sciences Center and the Department of Veterans Affairs Medical Center in Denver. The study results appear in the September 15, 1999, issue of the Journal of Neuroscience.*

The animals that received supplements were given either blueberry, strawberry, or spinach extracts. Investigators found that the group of rats that was fed blueberry supplements came out on top in tests of balance and coordination. The two groups given strawberry or blueberry supplements showed the most compelling evidence of protection against oxidative stress in their brains. On tests of working memory, all three groups receiving supplements outperformed their control counterparts. In addition, the groups receiving supplements all showed signs of the presence of Vitamin E, a key antioxidant, in their brains.

"The exciting finding from this study is the potential reversal of some age-related impairments in both memory and motor coordination, especially with blueberry supplements," said Molly Wagtster, Ph.D., a health Scientist Administrator with the NIA's Neuroscience and Neuropsychology of Aging Program. "For these animals at least, investigators were able to produce a noticeable improvement within a relatively short period of time. A next important step in the research will be to see if the improvements are long lasting."

When a cell converts oxygen into energy, tiny molecules called free radicals are made. When produced in normal amounts, free radicals work to rid the body of harmful toxins, thereby keeping it healthy. When produced in toxic amounts, however, free radicals damage the body's cellular machinery, resulting in cell death and tissue damage. This process is called *oxidative stress*.

"Whether results found in this study will also prove true for humans remains to be seen," says Marcelle Morrison-Bogorad, Ph.D., who directs the NIA's Neuroscience and Neuropsychology of Aging Program. "The only way to determine whether particular food ingredients actually work to slow age-related cognitive decline in humans as well is to conduct controlled clinical trials" The NIA has recently funded additions to two ongoing clinical trials testing whether a number of over-the-counter agents, including antioxidants such as vitamin E, influence the rate of cognitive decline in older women.

Plant chemicals, called *phytochemicals*, are present in fruits and vegetables and may have additional

beneficial properties beyond antioxidant activity. The authors believe that the phytochemicals present in blueberries, strawberries, strawberries, and spinach may have properties that increase cell membrane fluidity, allowing important nutrients and chemical signals to pass in and out of the cell, thereby reducing inflammatory processes in tissues.

Recent studies suggest that a diet rich in fruits and vegetables--natural dietary sources of antioxidants--may have a beneficial anti-cancer effect. Orange and yellow vegetables, fruits, and whole grains are all rich in natural antioxidants. Several currently popular substances, including vitamin E, beta carotene, vitamin C, and selenium, are also thought to have antioxidant effects in the body, but how they actually work is not entirely understood. Scientists are studying the effectiveness of these and other agents for their antioxidant properties and for their ability to protect cells against damage and death associated with oxidative stress.

"When we hear these promising results, we also may hear an echo of our wise mothers' voices--Eat your fruits and vegetables," says Dr. Wagster.

The National Institute on Aging, part of the National Institutes of Health (NIH), located in Bethesda, Maryland, leads the Federal effort supporting basic, clinical, epidemiological and social research on aging and the special needs of older people.

Press release from the National Institute of Health. Joseph, J.A., Shukitt-Hale B., Denisova, N.A. Bielinski D., Martin, A., McEwen, J.J., and Bickford, P.C. "reversal of Age-Related Declines in the Neuronal Signal Transduction, Cognitive, and Motor Behavioral Deficits with Blueberry, Spinach, or Strawberry Dietary Supplementation," Journal of Neuroscience, September 15, 1999, Vol. 19, No. 18. pp. 8114-8121.