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Blueberries and Health

US Highbush Blueberry Council

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food be your
medicine!

Hippocrates

Scientists are discovering that the health benefits of blueberries may be as far reaching as preventing cancer and heart disease, preventing urinary tract infections, to retarding the effects of aging particularly the loss of memory and motor skills. As links are made between diet and health, the wisdom of Hippocrates rings true.

Blueberries and Aging

Studies of older laboratory animals consuming blueberry supplemented diets have shown measurable improvements in memory, coordination and balance. Research at the USDA Human Nutrition Research Center has also shown neuron regeneration in older animals.

Joseph JA, Denisova NA, Arendash G, Gordon M, Diamond D, Shukitt-Hale B, Morgan D. Blueberry supplementation enhances signaling and prevents behavioral deficits in an Alzheimer disease model. *Nutritional Neuroscience*, 2003, 6:153-162.

Based on data from this study the research states, "...it may be possible to overcome genetic predispositions to Alzheimer disease through diet." The researchers fed blueberry supplemented diets to transgenic mice that develop cognitive loss and deposits in the brain similar to that seen in Alzheimer disease. Those fed blueberry supplemented diets (2% supplementation of the control diet, from 4 to 12 months of age) showed less impairment of cognitive function than those fed the control diet.

Goyarzu P, Malin DH, Lau FC, Tablialatela G, Moon WD, Jenings R, Moy E, Moy D, Lippold S, Shukitt-Hale B, Joseph JA. "Blueberry supplemented diet: effects on object recognition memory and nuclear factor-kappa B levels in aged rats", *Nutritional Neuroscience*, 2004, 7:75-83.

Researchers from the Universidad Nacional Autonoma de Mexico, University of Houston-Clear Lake, University of Texas and Tufts University have found that a blueberry-enriched diet prevented an age-related increase in the protein NF-B. NF-B is a protein transcription factor that is elevated by aging and oxidative stress. The rats were maintained for four months on a control diet or a blueberry-enriched diet. In 4 out of 5 regions of the brain, aged rats maintained on the control diet had significantly higher average NF-B levels than the younger rats on the same control diet. The aged rats on the control diet also had significantly higher NF-B levels than the aged rats on the blueberry-enriched diet in 4 out of 5 regions of the brain. The level of NF-B in the aged rats on the blueberry-enriched diet and the young rats on the control differed significantly in only one region of the brain.

Spangler EL, Duffy K, Devan B, Guo Z, Bowker J, Shukitt-Hale B, Joseph JA, Ingram DK. Rats fed a blueberry-enriched diet exhibit greater protection against a kainate-induced learning impairment. Program No. 735.10. Abstract. Washington DC: Society for Neuroscience, 2003.

Rats were fed either a control diet or a diet supplemented with a 2% blueberry extract for 8-10 weeks. Rats were then injured in the dorsal hippocampus region of the brain. They were then evaluated in a maze task that was proven to be sensitive to aging and hippocampal dysfunction. All rats exhibited a learning impairment in the maze task after injury however the rats on the blueberry diet had significantly less impairment than that observed in the control diet group.

Youdim KA, Shukitt-Hale B, Martin A, Wang H, Denisova N, Bickford PC, Joseph JA. "Short-term dietary supplementation of blueberry polyphenolics: Beneficial effects on aging brain performance and peripheral tissue function," *Nutritional Neuroscience*, 2000, 3:383-397.

This study examined if blueberry extracts were able to ameliorate age-related declines in neuronal and cognitive function in laboratory animals fed a well balanced diet. After consuming diets supplemented with blueberry extract for eight weeks the subjects showed improvement in normal age-related declines in behavioral parameters such as balance, coordination, working memory and reference memory.

Joseph JA, Shukitt-Hale B, Denisova NA, Bielinski D, Martin A, McEwen JJ, Bickford PC. "Reversals of age-related declines in neuronal signal transduction, cognitive, and motor behavioral deficits with blueberry, spinach, or strawberry dietary supplementation," *Journal of Neuroscience*, 1999, 19:8114-8121.

When 19 month old rats were fed 18.6 grams of dried blueberry extract per kilogram of diet for eight weeks, the diet was effective in reversing age-related deficits in several neuronal and behavioral parameters.