

LE Magazine May 2006

In The NEWS

Resveratrol Extends Life Span in Vertebrate



Colored scanning electron micrograph of endothelial cells lining the inside of a blood vessel.

Scientific studies have demonstrated that resveratrol, a compound found in grapes and other plant foods, extends life span in yeast, roundworms, and fruit flies. Now researchers in Italy have shown that resveratrol can extend the life span of the vertebrate *Nothobranchius furzeri*, a small fish with a maximum lifespan of 13 weeks in captivity.*

(Vertebrates include fish, amphibians, reptiles, birds, and mammals, all of which are characterized by a segmented spinal column and a distinct, well-differentiated head.)

Italian scientists added three concentrations of resveratrol to the food of 110 four-week-old fish, while 47 fish received standard diets.

Thirty fish received diets containing 24 micrograms of resveratrol per gram (mcg/g) of food, 60 received 120 mcg/g of resveratrol, and 20 fish received 600 mcg/g. The fish were fed a defined amount of food twice daily.

Supplementation with resveratrol resulted in a dose-dependent extension of both median and maximum life span. The 120-mcg/g dose of resveratrol was associated with a 33% increase in median life span and a 27% jump in maximum life span, while the highest dose of resveratrol elicited a 56% increase in median life span and a 59% increase in maximum life span. Resveratrol-treated females continued to lay eggs and males were still able to fertilize eggs at 12 weeks of age, and these eggs developed into normal adults.

Control fish showed a reduction in spontaneous swimming at nine weeks of age compared to five-week-old control fish, indicating a reduction in locomotor efficiency. However, in resveratrol-treated fish, swimming performance increased until 10 weeks of age. Cognitive performance, as evaluated by task learning, also declined in nine-week-old control fish compared to five-week-old control fish. However, in fish treated with the 120-mcg/g dose of resveratrol, this age-dependent reduction was prevented. Moreover, the resveratrol-treated fish showed an absence of neurofibrillary degeneration, which was present in nine-week-old, but not five-week-old, control fish. These findings led the authors to speculate that life extension induced by resveratrol could be the result of a protective effect exerted on the nervous system.

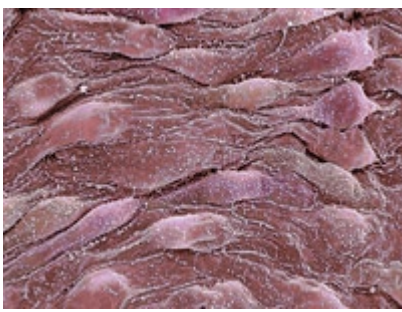
The study authors noted that although resveratrol's mechanisms of action are not clear, "the observation that its supplementation with food extends vertebrate life span and delays motor and cognitive age-related decline could be of high relevance for the prevention of aging-related diseases in the human population."

—Dayna Dye

Reference

* Valenzano DR, Terzibasi E, Genade T, Cattaneo A, Domenici L, Cellerino A. Resveratrol prolongs life span and retards the onset of age-related markers in a short-lived vertebrate. *Curr Biol*. 2006 Feb]. 7;16(3):296-300.

Garlic Improves Impaired Endothelial Dysfunction



Aged garlic extract improves endothelial function and supports healthy blood flow in men with coronary artery disease, according to researchers at the University of Otago in New Zealand.*

Endothelial dysfunction occurs when the blood vessel lining is unable to dilate, or enlarge, to facilitate greater blood flow in response to tissue demands. Endothelial dysfunction is thought to play a crucial role in the initiation and progression of coronary artery disease.

Fifteen men between 45 and 70 years of age with stable coronary artery disease were randomly assigned to an experimental group that received 600 mg of aged garlic extract

four times daily for two weeks, or to a control group that received placebo. After a two-week washout period, the subjects were crossed over to the alternate group for an additional two weeks. Venous blood was collected at baseline and at two-week intervals throughout the study to assess measures of oxidation, inflammation, and endothelial activation. Endothelium-dependent dilation of the brachial artery was determined by sonography at baseline and at two-week intervals.

Brachial artery dilation, an indicator of endothelial function, increased from 4.3% to 6.2%, or 44%, after two weeks of garlic supplementation, and the response persisted after two weeks of treatment with placebo. The greater the impairment of vasodilation, the greater was the response to garlic. In this study, treatment with garlic did not affect biomarkers of oxidative stress, inflammation, or endothelial activation.

Treatment with aged garlic extract may thus improve impaired endothelial function in men with coronary artery disease. Additional studies will be required to determine the optimal dosing of garlic and whether garlic reduces the incidence of cardiovascular events.

—Linda M. Smith, RN

Reference

* Williams MJ, Sutherland WH, McCormick MP, Yeoman DJ, de Jong SA. Aged garlic extract improves endothelial function in men with coronary artery disease. *Phytother Res.* 2005 Apr;19(4):314-9.

CoQ10 Protects Against Amyloid Beta Peptides

Coenzyme Q10 protects against the neuro-toxic effects of amyloid beta peptides, a pathological characteristic of Alzheimer's disease, according to researchers at Portugal's University of Coimbra.*

Amyloid beta peptides impair mitochondrial function and increase oxidative stress, leading to toxic effects on the nervous system. Because CoQ10 is both a potent antioxidant and a cofactor in mitochondrial energy production, researchers sought to determine whether it blocks amyloid beta peptide-induced neuro-toxicity.

Since both aging and diabetes are associated with an elevated risk of Alzheimer's disease, the investigators utilized aged diabetic rats for their experiments. Following treatment with coenzyme Q10, brain mitochondria from the test subjects were isolated. In parallel control experiments, the research team utilized mitochondria from healthy rats. In the lab, the scientists exposed the rat mitochondria to amyloid beta peptides, and assessed the effects on energy production and oxidative stress.

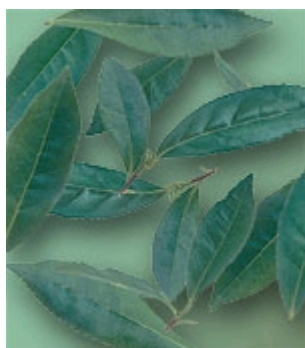
In the control group, amyloid beta peptides led to a significant decrease in mitochondrial energy production, as well as increased production of reactive oxygen species, a source of oxidative stress. CoQ10 treatment, however, attenuated the amyloid beta peptide-induced decline in energy production and increase in oxidative stress. The rats treated with CoQ10 were thus significantly more resistant to the neurotoxic effects of amyloid beta peptides than were the untreated rats.

CoQ10 appears to counteract the alterations in brain mitochondria caused by amyloid beta peptides, and thus may help to avert the energy deficiency and oxidative stress that characterizes both diabetes and Alzheimer's. Given the decline in CoQ10 with aging, the cumulative effects of oxidative stress, and the irreversibility of neural damage, especially in diabetics, the study authors strongly recommend the use of supplemental coenzyme Q10 for enhanced protection against Alzheimer's disease.

—Linda M. Smith, RN

Reference

Green Tea May Prevent Skin Cancer



Green tea polyphenols show promise as anti-carcinogenic agents and may prevent the development of ultraviolet radiation-induced skin cancer, according to researchers at the University of Alabama at Birmingham.*

Consumption of green tea has been shown to have numerous health benefits, mainly due to the antioxidant properties of the catechins it contains.

Two groups of mice were exposed to ultra-violet B radiation three times a week for 24 weeks. The first group was given only water, while the second group was given water containing 2 grams per liter of green tea polyphenols. A control group drank water and was not exposed to ultraviolet radiation.

Analysis of the ultraviolet light-exposed mice revealed a significant drop in cancer incidence and tumor growth in the group receiving green tea polyphenols. In this group, tumor incidence was reduced by 35%, tumor multiplicity (number) by 63%, and overall tumor growth by 55%.

These remarkable numbers are due to the effects of green tea polyphenols on several biomarkers involved in the formation of skin cancer. These include the inhibition of angiogenic factors, which concern the growth and differentiation of blood vessels, and an increased number of cytotoxic T-cells in the tumor microenvironment, which indicates enhanced immune response in the mice.

According to researcher Santosh K. Katiyar, PhD, "This study, which was conducted in animals, suggests that regular use of green tea as a beverage (5-6 cups a day) may be helpful in the prevention of skin cancers in humans. However, further studies are required to be performed in humans or in high-risk human individuals. These future studies will confirm the beneficial effects of green tea against the risk of skin cancer."

—Abigail P. Sadowsky

Reference

* Mantena SK, Meeran SM, Elmets CA, Katiyar SK. Orally administered green tea polyphenols prevent ultraviolet radiation-induced skin cancer in mice through activation of cytotoxic T cells and inhibition of angiogenesis in tumors. *J Nutr*. 2005 Dec;135(12):2871-7.

Weight, Inactivity Tied to Women's Cardiovascular Risk



American women fail to understand their risk for heart disease and how exercise and body weight influence that risk, according to a recent report by the American Heart Association.

Coronary heart disease, the number-one killer of women in the US, causes more deaths in adults over the age of 25 than the five other leading causes of death combined. In 2003, 6 million women had coronary heart disease and 3.1 million had strokes, leading to 483,300 deaths.¹

To study the relationship between obesity, physical activity, and heart disease risk, researchers at the Harvard University School of Public Health followed 88,393 women, ages 34 to 59, in the Nurses' Health Study for 20 years. None of the women had cardiovascular disease or cancer at the study's onset.

During the 20 years of follow-up, there were 889 deaths due to coronary heart disease, as well as 1,469 cases of non-fatal myocardial infarction. Analyzing these data, Harvard scientists determined that obesity and being overweight were associated with an increased risk of coronary heart disease, while increasing levels of physical activity were associated with a graded reduction in risk.²

Active women of healthy weight served as a reference group. Women who were both obese and inactive had a 3.4 times greater heart disease risk over 20 years, while women who were active but obese were 2.5 times more likely to have heart disease. Women of normal weight who did not exercise had 1.5 times the risk for heart disease than did lean, active women. Obese, sedentary, smoking women demonstrated the highest risk for coronary heart disease, which was 9.4 times higher than the risk for lean, active, non-smoking women.²

These findings counter some recent studies suggesting that overweight people may avert cardiovascular disease risk by being fit, demonstrating that both fitness levels and weight are independent and important predictors of heart disease risk.²

According to researcher Dr. Frank Hu, "A high level of physical activity did not eliminate the risk of coronary heart disease associated with obesity and leanness did not counteract coronary heart disease risk associated with inactivity."¹

—Elizabeth Wagner, ND

Reference

1. Available at: http://today.reuters.com/news/newsArticle.aspx?type=healthNews&storyID=2006-0131T212527Z_01_N3164817_RTRUKOC_0_US-HEART.xml. Accessed February 3, 2006.

2. Li TY, Rana JS, Manson JE, et al. Obesity as compared with physical activity in predicting risk of coronary heart disease in women. *Circulation*. 2006 Jan 31;113(4):499-506.

CRP May Predict Lung Cancer Risk in Smokers



Elevated levels of the inflammatory marker C-reactive protein (CRP) may greatly assist in identifying smokers who have abnormal airway lesions that are likely to progress to lung cancer, according to a recent report from the British Columbia Cancer Agency.*

Chronic inflammation is implicated in the development of pre-cancerous and cancerous lesions of the airways and lungs. Until now, however, it has been unclear whether circulating biomarkers of inflammation could predict when abnormal airway lesions are likely to progress to more advanced stages.

At the study's onset, the Canadian team measured CRP levels in 65 former and current smokers, all of whom had at least one site of bronchial dysplasia. Marked by abnormal cell growth in the bronchial tubes, bronchial dysplasia may be a precursor of squamous cell lung carcinoma.

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Six months later, the research team measured CRP levels and conducted repeat bronchial biopsies to assess for progressive dysplasia, defined as areas of dysplasia that had worsened by two grades of development or development of new lesions. In the one half of study participants who developed progressive dysplastic lesions after six months, baseline CRP levels were 64% higher than in those without progressive disease. Only one of eight participants with a baseline CRP level of less than 0.5 mg/L developed progressive dysplasia, while 31 of 57 participants with CRP levels greater than or equal to 0.5 mg/L developed progressive disease. Thus, people with higher CRP levels were nearly 10 times more likely to develop progressive disease than those with lower levels.

According to the research team, plasma CRP “appears to have excellent predictive powers in identifying participants with bronchial dysplastic lesions whose lesions progress to more advanced stages of dysplasia.” The investigators noted that further studies are needed to assess exactly how CRP influences the pathogenesis of lung cancer.

—Elizabeth Wagner, ND

Reference

* Sin DD, Man SF, McWilliams A, Lam S.

Progression of airway dysplasia and C-reactive protein in smokers at high risk of lung cancer. *Am J Respir Crit Care Med.* 2006 Mar 1;173(5):535-9.

Omega-3 Fatty Acids Boost Bone Health



Marine-derived omega-3 fatty acids, particularly DHA (docosahexaenoic acid), increase calcium absorption and deposition in bone, according to researchers in New Zealand.*

Marine sources of omega-3 fatty acids are rich in DHA and EPA (eicosapentaenoic acid), while plant-derived sources provide alpha-linolenic acid, which serves as the precursor of DHA and EPA in humans.

Forty male rats, 10 in each of four groups, were fed a semi-synthetic diet supplemented with corn oil, evening primrose oil, fish oil, or tuna oil for six weeks. Scientists then assessed calcium absorption, bone mineral density, bone calcium content, and bone biomechanics of the test subjects.

The rats fed tuna oil absorbed significantly more calcium than the control group fed corn oil. In addition, the rats fed fish or tuna oil excreted less calcium compared to the rats fed corn oil. Bone calcium content was significantly higher in the tuna oil group than in the corn oil group.

The tuna oil group demonstrated higher bone mineral density of the femur and spine than did the corn oil group. Higher levels of DHA in red blood cell membranes were significantly correlated with higher bone density and bone calcium content.

Marine-derived omega-3 fatty acid consumption thus helped to increase the bioavailability of dietary calcium and support its integration into bone tissue. Tuna oil, which is particularly rich in DHA, appeared to more effectively support bone health than fish oil, in which EPA predominates. These findings suggest that consumption of marine-derived omega-3 fatty acids, particularly DHA, may improve calcium absorption, optimize bone density, and offer protection against conditions such as osteoporosis.

—Linda M. Smith, RN

Reference

* Kruger MC, Schollum LM. Is docosahexaenoic acid more effective than eicosapentaenoic acid for increasing calcium bioavailability? Prostaglandins Leukot Essent Fatty Acids. 2005 Nov;73(5):327-34.

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