

LE Magazine September 2003

IN THE NEWS

Fish Oil May Help Diabetic Hearts

The heart-healthy benefits of fish oil are well known. Many research studies have demonstrated a relationship between fish consumption and a reduced risk of developing heart disease. However, little data exists on the benefit of fish consumption for diabetics. Until now, that is.

Researchers at Harvard examined the dietary records of more than 5,000 female nurses diagnosed with type 2 diabetes who were followed for 16 years as part of the ongoing Nurses' Health Study. They found that the more fish the nurses ate, and consequently the more omega-3 fatty acids they consumed, the lower their risk was of developing or dying from heart disease.

The largest reduction in risk was seen in women who ate the most fish – at least five times per week – as they were 64% less likely to develop heart disease than women who seldom ate fish. These same women were also 52% less likely to die of heart disease. These results were published in the April 15, 2003 issue of *Circulation: Journal of the American Heart Association*.¹



“High consumption of fish – two to four servings per week – can substantially reduce the risk of coronary heart disease and mortality among people with type 2 diabetes,” says Frank B. Hu, M.D., lead author of the study and associate professor of nutrition and epidemiology at the Harvard School of Public Health.

Although this study only involved women, Dr. Hu told Life Extension magazine that he believes “the results can apply to diabetic men as well.”

Researchers credit most of the cardiovascular protection obtained from fish consumption on their high omega-3 fatty acid composition. Although the exact mechanisms are still unclear, these substances have shown numerous cardiovascular benefits, including helping to prevent the development of blood clots, averting a potentially fatal irregular heart rhythm and reducing blood pressure. Omega-3 fatty acids have also been proven to lower triglyceride levels in the bloodstream.

There are primarily two types of omega-3 polyunsaturated fatty acids. The first type, alpha-linolenic acid, comes largely from plant oils. The second type, found predominately in fish oils, includes eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). EPA and DHA are labeled “essential” fatty acids because they are necessary for normal development of the brain and retina (the light-sensitive tissue in the back of the eye). The human body can convert a portion of alpha-linoleic acid into EPA and DHA.²

One of the concerns about obtaining EPA and DHA from eating fish is that some species of fish may contain significant levels of environmental contaminants, such as methylmercury, dioxins and polychlorinated biphenyls (PCBs). This might be especially important for children and pregnant or lactating women.³

“This is an unresolved issue,” says Dr. Hu. “Some fish contains more mercury than others. The best way to avoid problems is to vary the type of fish you eat.”

Since the health benefits of fish are apparently derived from their high levels EPA and DHA omega-3 fatty acids, it is assumed that fish oil supplements provide the same cardiovascular advantages. However, fish oil supplements eliminate the risk of consuming environmental toxins. “Our study did not focus on supplements,” says Dr. Hu. “However, theoretically they can be beneficial for type 2 diabetics.”

While omega-3 fatty acids have proven cardiovascular benefits, their use as a therapy for cardiovascular disease should only be in addition to standard medications for the treatments of heart disease under the supervision of a physician.

This issue was addressed in an accompanying editorial written by Scott M. Grundy, M.D., Ph.D., of the Center for Human Nutrition at the University of Texas Southwestern Medical Center at Dallas. Dr. Grundy stated that in future research “supplemental fish oil would have to be add-on therapy to other standard treatment, e.g., antiplatelet drugs, beta-blockers, cholesterol-lowering drugs and angiotensin-converting enzyme inhibitors.”²

—Dr. Marc Ellman



References

1. Hu FB, et al. Fish and long-chain omega-3 fatty acid intake and risk of coronary heart disease and total mortality in diabetic women. *Circulation*. 2003 Apr 15;107(14):1852-7. Epub 2003 Mar 31.
2. Grundy SM. N-3 fatty acids: priority for post-myocardial infarction clinical trials. *Circulation*. 2003 Apr 15;107(14):1834-6.
3. Kris-Etherton PM. Fish consumption, fish oil, omega-3 fatty acids and cardiovascular disease. *Circulation*. 2002 Nov 19;106(21):2747-57.

Vitamin C Helps Transform Stem Cells Into Heart Cells

The role of vitamin C in the body may be even greater than previously believed. New research has found that vitamin C helps convert mouse embryonic stem cells growing in the laboratory into heart muscle cells.¹

Embryonic stem cells are unspecialized cells that are derived from the very early stages of fetal development. These cells can convert into any type of cell in the body through a process termed differentiation. Researchers hope that the ability to transform these cells into viable heart cells in the laboratory can lead to effective treatments for heart failure—the inability of the heart to pump enough blood to properly supply the body. Heart failure occurs when the heart is significantly damaged, often from a heart attack or genetic disease.

The American Heart Association estimates that more than 50,000 heart-failure patients die each year in the United States alone. Perhaps the ability to transplant healthy heart cells into the sick hearts of these patients will keep these patients living longer and better lives.

“Although the findings of this study are very preliminary with respect to their impact on human lives, this line of research has enormous implications for the future care of thousands of patients who develop heart failure each year,” said Robert O. Bonow, M.D., president of the American Heart Association in an official statement. “Identifying mechanisms to transform stem cells into differentiated heart muscle cells is an important step toward clinical reality.”²

For their study, which was published in the April 15, 2003 issue of *Circulation: Journal of the American Heart Association*, researchers tested 880 bioactive substances, including drugs and vitamins, to see if they prompted mouse stem cells to transform into heart cells.³



“We only got one out of the 880 to light up, and that was from ascorbic acid, the chemical commonly known as vitamin C,” said Richard T. Lee, M.D., senior author of the study. Lee is an associate professor of medicine at Harvard Medical School and Brigham and Women’s Hospital in Boston and a lecturer in biological engineering at the Massachusetts Institute of Technology in Cambridge, Massachusetts.

Many benefits of vitamin C have been attributed to its ability to neutralize oxidants. However, the researchers of this study believe that the ability of vitamin C to promote cardiac differentiation of stem cells is unrelated to its antioxidant abilities. This is because other antioxidant compounds tested, including vitamin E, did not promote the development of heart cells.

“The real significance of the study is that it indicates that we will be able to find other ways to generate heart cells from stem

cells more efficiently,” said Lee. “It also raises interesting questions about the role of vitamin C in the development of the embryo’s heart.”

—Dr. Marc Ellman

References

1. Takahashi T. et al. Ascorbic acid enhances differentiation of embryonic stem cells into cardiac myocytes. *Circulation*. 2003 Apr 15;107(14):1912-6. Epub 2003 Mar 31.
2. www.americanheart.org/presenter.jhtml?identifier=3010515
3. Tomosaburo T, et al. Ascorbic acid enhances differentiation of embryonic stem cells into cardiac myocytes. *Circulation* 2003; 107:1912.

IN THE NEWS

Omega-3 Fatty Acids Reduce Risk of AMD



Age-related macular degeneration (AMD), is a major cause of central vision loss in the elderly. Treatments are limited and hope lies in reducing the risk of the disease and preventing its development. A study reported at the Annual Meeting of the Association for Research in Vision and Ophthalmology, in Florida, May, 2003, provides new data supporting the effects of diet and nutrients, in lowering the risks of having a type of AMD that leads to blurred vision, and in severe cases, blindness. The study, carried out by Dr. JP SanGiovanni and colleagues, from the National Eye Institute, in Bethesda MD, showed, that after taking into account other nutrient and non-nutrient factors, that may affect the risk of AMD, a higher intake of omega n-3 polyunsaturated fatty acids (LCPUFA) and fish was associated with decreased risk of having neovascular AMD.

Approximately 1.7 million people over 64, suffer from the severe form AMD, that leads to blindness. The macula is an area located in the center of the retina and is responsible for fine and detailed central vision. The degenerative changes associated with AMD include alterations in the retinal tissues and atrophy of the cells, that account for a number of different types of AMD, and the formation of new blood vessels (neovascularization) under the retina, that accounts for another type, called neovascular AMD, where leaking blood vessels distort the retina and cause blurred vision and loss of eyesight.

The Age-Related Eye Disease Study (AREDS), reported at the meeting, was a case control retrospective study of 4,513 participants, aged 60 to 80 years. Subjects completed a self-administered food questionnaire, and provided information on the frequency and portions of fish intake in the last year, as well as other health and lifestyle data. The types of fish considered, included fried fish or fish sandwiches, tuna salad or tuna casserole, oysters, other shell fish and broiled or baked fish. People without AMD served as control groups for each of the four different types of AMD tested.

The results showed that highest total fish consumption (compared to no intake), of more than two servings a week, of broiled or baked fish or of tuna, reduced the risk of having neovascular AMD, but not other types of AMD, by approximately 50%.

When assessing AMD risk in relation to intake of omega-3 fatty acids, that are high in marine products, the results showed that risk for neovascular AMD, but not other types of AMD, was significantly decreased, by approximately 60%, for people with the highest intake of total omega-3 fatty acids (highest quintiles versus lowest quintiles). A similar risk reduction (approximately 53%), was found with intake of docosahexaenoic (DHA), an omega-3 fatty acid, that is selectively taken up and retained in the photoreceptors of the eye.

The studies indicate an independent association between fish intake and omega-3 fatty acids intake and neovascular AMD, showing that high intake of fish, or omega-3 fatty acids, halves the risk of having the disease.

—Carmia Borek, Ph.D.

Antioxidant Combo Slows Aging, Fights Dementia and Increases Life Span

Four antioxidants, used in combination, protect against cell abnormalities of the type seen in aging and Alzheimer's disease (AD). They also increase life span. Researchers in Australia and the U.S. report that giving mice supplemental vitamin E acetate, ginkgo biloba, pycnogenol and ascorbyl palmitate (fat-soluble vitamin C) at doses a human would take, reduces by ten times the number of "inclusion bodies" in brain cells. Inclusion bodies can best be described as abnormal structures that appear in aging cells.¹ The inclusion bodies in this study cross-reacted with beta amyloid, an abnormal protein found in Alzheimer's patients' brains—which means that the abnormal structures could contribute to a person getting AD. Not only does the supplement combination reduce inclusion bodies, it reduces them in an area of the brain affected by Alzheimer's disease. In addition to keeping their brains functional, the supplements (which all have antioxidant properties) also made the mice live longer. At 270 days, 55% of the supplement-treated mice were alive versus 22% of the animals who didn't get the combination. This is the first time it has been proven that a combination of antioxidants can protect the hippocampus against inclusion bodies, an aspect of aging and dementia that's not well studied.



The results could have important implications for people with a genetic predisposition to Alzheimer's. Mutations in a gene that makes a protein called "apolipoprotein E" increase the risk of the Alzheimer's type of dementia. ApoE, as it is known, is one of the proteins that associates with fat (similar to "LDL" or "HDL" cholesterol). Research shows that at least one form of ApoE is an antioxidant, and it reduces Alzheimer's-related proteins that interfere with brain function. When it is missing because of a genetic mutation, the brain is more susceptible to free radical damage and Alzheimer's.²

The mice used in the study didn't have any ApoE. They are genetically deficient—similar to some people who develop Alzheimer's. But the study shows that the supplement combination was able to overcome the deficiency and provide significant protection. Researchers in Japan have demonstrated that both ApoE and antioxidants reduce the formation of amyloid beta fibrils, abnormal proteins found in the brains of people with dementia.³

—Terri Mitchell

References

1. Veurink G, et al. Reduction of inclusion body pathology in apoE-deficient mice fed a combination of antioxidants. *Free Rad Biol Med* 2003. 34:1070-77.
2. Laws SM, et al. Expanding the association between the ApoE gene and the risk of Alzheimer's disease: possible roles for ApoE promoter polymorphisms and alterations in ApoE transcription. *J Neurochem* 2003. 84:1215-36.
3. Naiki H, et al. Apolipoprotein E and antioxidants have different mechanisms of inhibiting Alzheimer's beta-amyloid fibril formation in vitro. *Biochem* 1998 37:17882-9.

Supplements Improve Heart Function in Life-Threatening Heart Disease



Some types of heart disease can progress to congestive heart failure. This is a very serious, life-threatening complication involving the left chamber of the heart known as the left ventricle. Mortality can be predicted by a measurement of left ventricular end-diastolic volume. The higher the volume, the less likely a person will be to survive heart surgery.

Researchers in Canada approached the problem of high diastolic volume by attempting to reverse underlying biochemical abnormalities with specific supplements. They were successful.¹

One of the biochemical abnormalities in congestive heart failure is an energy deficit. The heart, which moves constantly, has a high demand for energy. Normally, demands are met by mitochondria—tiny power plants inside cells. People with congestive heart failure, however, have a profound lack of energy, and two factors crucial for producing it are deficient: carnitine and coenzyme Q10. Studies show that supplementing the diet with these two factors has beneficial effects, including better survival. Also, a study published in 1995 indicates that L-carnitine supplements reduce abnormal enlargement of the left ventricle after a heart attack.²

In addition to the energy deficits, calcium build-up is a problem in congestive heart failure. This is a very serious problem inasmuch as the amount of calcium inside cells is critical to how they perform. If the muscle cells of the heart are overloaded with calcium, heart muscles can't contract properly. Taurine, an amino acid, is a natural calcium regulator in heart cells. Studies in hamsters show that supplemental taurine reduces calcium build-up, and helps protect heart tissue.

Thirty-eight people with congestive heart failure participated in the Canadian study. All were scheduled for heart surgery, and all had an ejection fraction under 40%. Half were given a drink with 3 grams of taurine, 3 grams of L-carnitine, and 150 mg of coenzyme Q10 everyday. Half were given a placebo. Most had surgery about three weeks later.³

The results indicate that the three supplements reduce left ventricular end-diastolic volume, an important indicator of survival. This is the first double-blind, controlled study of this type in humans. In a previous, non-controlled study, 13 of 15 people who were classified as III or IV in severity were upgraded to class II after taking 4 grams of taurine a day.⁴

—Terri Mitchell

References

1. Azari J, et al. Taurine decreases lesion severity in the hearts of carcdomyopathic hamsters. *Can J Neurol Sci* 1980. 7:435-40.
2. Iliceto S, et al. Effects of L-carnitine administration on left ventricular remodeling after acute anterior myocardial infarction: the L-carnitine Ecocardiografia Digitalizzata Infarto Miocardico (CEDIM) Trial. *J Am Coll Cardiol* 1995. 26:380-7.
3. Jeejeebhoy F, et al. Nutritional supplementation with MyoVive repletes essential cardiac myocyte nutrients and reduces left ventricular size in patients with left ventricular dysfunction. *Am Heart J* 2002. 143:1092-1100.
4. Azuma J, et al. Therapy of congestive heart failure with orally administered taurine. *Clin Ther* 1983. 5:398-408

IN THE NEWS

New Study Indicates that Diabetics Might Get Worse on Certain NSAIDs

It is only experimental at this point, but a new study suggests that, except for aspirin, people with diabetes should choose their non-steroidal anti-inflammatories carefully. Researchers at the University of Michigan tested the effects of two different kinds of NSAIDs on diabetic rats, and found that the standard variety that suppresses both COX-1 and COX-2 can make nerve-related complications of diabetes worse. Selective COX-2 inhibitors did not have the negative effects. Aspirin does not appear to have negative effects either.¹

The two drugs used in the study were flurbiprofen (Ansaid, a COX-1 and COX-2 inhibitor) and meloxicam (Mobic, a COX-2 inhibitor). In assessing the effects on diabetic neuropathy (a degeneration of nerves that causes abnormal and painful sensations in diabetics such as “pins-and-needles”), it was discovered that the non-selective NSAID, Ansaid worsened the underlying chemistry of nerve problems (nerve blood flow, nerve myo-inositol content, motor nerve conduction velocity, reduced taurine levels, and reduced Na,K-ATPase activity). Surprisingly, the drug had the same negative effects on the nerves of non-diabetic rodents. The study dose is approximately the equivalent of what a human would take. Meloxicam, the COX-2 inhibitor, didn't have these effects. In the case of nerve blood flow, Meloxicam actually reversed diabetes-related deficits.



The research helps explain reports that non-specific NSAIDs can cause neuropathy in people without diabetes. Indomethacin is one of the NSAIDs reported to cause neuropathy in non-diabetics.^{3,4} The antibiotic, Cipro, and its fluoroquinolone relatives, have also been reported to cause neuropathy in people without diabetes.^{2,5} The negative effects of Ansaid in the above study could be reversed with supplemental acetyl-L-carnitine, a readily-available, non-toxic supplement that has multi-benefits for nerve, heart and brain health.¹

—Terri Mitchell

References

1. Pop-Busui R, et al. Dissection of metabolic, vascular and nerve conduction interrelationships in experimental diabetic neuropathy by cyclooxygenase inhibition and acetyl-L-carnitine administration. *Diabetes* 2002. 51:2619-28.
2. Cohen JS. Peripheral neuropathy associated with fluoroquinolones. *Ann Pharmacother* 2001. 35:1540-7.
3. Eade OE, et al. Peripheral neuropathy and indomethacin. *Br Med J* 1975. 2:66-67.
4. Argov Z, et al. Drug-induced peripheral neuropathies. *Br Med J* 1979. 1:663-66.
5. Roloff J, et al. Neurologic adverse effects during concomitant treatment with ciprofloxacin, NSAID, and chloroquine: possible drug interaction. *Ann Pharmacother* 1993. 27:1058-9.

Live Longer, Healthier, Without Drugs

Fasting every other day is a sure-fire way to good health according to new research in rats. Experiments done at the National Institute on Aging show that skipping meals causes significant and lasting reductions in blood sugar, blood pressure and heart rate. The program worked even if it was started in adulthood. And that's not all. Resistance to stress, weight-loss and increased life span (by one-third) were part of the reward of skimping eating. Researchers have known for decades that calorie restriction extends life span—as long as the restricted diet meets nutrient requirements, but the findings about enhanced stress-resistance are new.

The study is the first to report that even though the rats skipping meals were just as active during the day as those getting three squares, they were less active at night. This coincides with reports that people on fasts sleep better, have better concentration, more vigor and are less likely to get upset during the day. Some of this may occur because fasting elevates growth hormone (GH) in aging people. Two days of fasting can elevate GH 400%. The hormone is impressive with regard to its ability to turn flab into muscle, restore an optimistic mind-set and reverse other signs of aging.

Every-other-day eating greatly improves the body's ability to cope with stress. It reduces levels of stress-activated hormones of

the kind that trigger heart attacks, and activates proteins designed to protect the body against stress. What happens when the anti-stress proteins are activated is that individual cells go into a “shutdown” mode until the stress blows over. The more stress proteins activated, the better the anti-stress protection. An everyday example of stress proteins in action is what happens when a plant doesn’t get watered. Dehydration causes the production of stress proteins in individual cells. These proteins cause normal processes like growth to stop. The plant wilts. When it’s watered, stress proteins degrade and the plant “comes alive” again—i.e., normal processes are restored.

The numbers on insulin and glucose in the fasting rat study are impressive. At three months, the levels of blood glucose in the animals not fasting were about 143 mg/dL compared to 118 for the fasting animals. By six months, levels had risen to 160 in the non-fasting animals compared to 120 in the fasting animals. There was a big difference in insulin levels. Non-fasting animals had approximately 120 nmol/L at three months compared to 70 for fasting animals. At six months, levels had risen to 133 for non-fasting animals, but remained steady for fasting animals at 74.

Weight loss is one of the benefits of fasting. The animals in the fasting study lost significant weight during the first four weeks of the study. Their weight then rebounded slightly but stayed fairly stable into old age when it again dropped. Age-related weight gain was significantly greater for the non-fasting rats, and throughout the study they weighed more than their fasting friends. At the point where the fasting rats’ body weight dropped in old age, non-fasting rats’ weight went up.

(When mice were put on the same regimen in another study, however, they made up for the lost calories on the eating day, and maintained their weight. They still, however, got the other benefits of caloric restriction (resistance to stress, lower glucose, etc.). This indicates that it’s not the calories per se that increase longevity in caloric restriction, it’s the fasting).

The heart rate, blood pressure and core body temperature of the rats in the fasting study was much lower than in rats eating everyday. This difference was maintained when the animals were exposed to stress. The fasting animals were also able to recover more quickly, and normalize their blood pressure and heart rate more efficiently.

Going without food every other day appears to have the same benefits as eating 30% less everyday. Both types of caloric restriction significantly extend life span and improve health. Other studies show that in addition to the benefits mentioned here, caloric restriction increases the resistance of brain cells to stress and provokes the formation of new neurons from stem cells. It increases the resistance to toxins and upregulates beneficial genes. It reduces the risk of cancer and reverses age-related declines in DHEA and melatonin, two important anti-aging hormones.

Does it work in people? Yes. UCLA researcher, Dr. Roy Walford, one of the pioneers in longevity research, did a two-year stint in the environmentally enclosed Biosphere. Caloric restriction had the same effects on the humans in the Biosphere as it does in rodents and monkeys. Weight loss, lower blood pressure, lower insulin and lower cholesterol were among the many benefits. All without drugs.

–Terri Mitchell

References

- Michalsen A, et al. Effects of short-term modified fasting on sleep patterns and daytime vigilance in non-obese subjects: results of a pilot study. *Ann Nutr Metab* 2003. 47:194-200.
- Wan R, et al. Intermittent food deprivation improves cardiovascular and neuroendocrine responses to stress in rats. *J Nutr* 2003. 133:1921-29.
- Hartman ML, et al. Pulsatile growth hormone secretion in older persons is enhanced by fasting without relationship to sleep stages. *J Clin Endocrinol Metab* 1996. 81:2694-701.
- Walford RL, et al. Alterations in physiologic hematologic hormonal, and biochemical parameters in humans restricted for a 2-year period. *J Gerontol A: Biol Sci Med Sci* 2002. 57:B211.
- Mattison JA, et al. Calorie restriction in rhesus monkeys. *Exp Gerontol* 2003. 38:35-46.
- Anson RM, et al. Intermittant fasting dissociates beneficial effects of dietary restriction on glucose metabolism and neuronal resistance to injury from calorie intake. *Proc Natl Acad Sci USA* 2003. 100(10):6216-20.
- Mai V, et al. Calorie restriction and diet composition modulate spontaneous intestinal tumorigenesis in *Apc(Min)* mice through different mechanisms. *Cancer Res* 2003. 63:1752-5.

Duan W, et al. Brain-derived neurotrophic factor mediates an excitoprotective effect of dietary restriction in mice. J Neurochem 2001. 76:619-26.

Bruce-Keller, et al. Food restriction reduces brain damage and improves behavioral outcome following excitotoxic and metabolic insults. Ann Neurol 1999. 45:8-15.

All Contents Copyright © 1995-2009 Life Extension Foundation All rights reserved.

LifeExtension®

These statements have not been evaluated by the FDA. These products are not intended to diagnose, treat, cure or prevent any disease. The information provided on this site is for informational purposes only and is not intended as a substitute for advice from your physician or other health care professional or any information contained on or in any product label or packaging. You should not use the information on this site for diagnosis or treatment of any health problem or for prescription of any medication or other treatment. You should consult with a healthcare professional before starting any diet, exercise or supplementation program, before taking any medication, or if you have or suspect you might have a health problem. You should not stop taking any medication without first consulting your physician.