

## **Fish Oils and Arrhythmias/Cardiac Arrest**

### **Summaries of the latest research concerning fish oils and arrhythmias/cardiac arrest**

Review supports benefits of omega-3 fatty acids for prevention of heart disease\* ATLANTA, GEORGIA. Omega-3 polyunsaturated fatty acids (n-3 PUFAs) have been linked to lower mortality from coronary heart disease (CHD) in several, but not all, observational studies on the topic. Prevention trials of n-3 PUFAs have also supported a role in CHD prevention, but several different varieties of n-3 PUFAs were used. Now, researchers from Emory University School of Medicine have reviewed the data from randomized controlled clinical trials on n-3 PUFAs and CHD. The studies were divided into those using plant-based n-3 PUFAs (alpha-linolenic acid, ALA), fish-based n-3 PUFAs (eicosapentaenoic acid, EPA, and docosahexaenoic acid, DHA), and fish consumption in the diet. Fourteen randomized clinical trials were included in the review, six of which were of fish oil, including one large trial of 10,000 participants. The researchers report a clear trend suggesting that there are important differences in CHD outcomes when using fish-based EPA or DHA compared with plant-based ALA. Most of the fish oil trials suggest a significant reduction in total mortality and CHD deaths and a possible strong antiarrhythmic effect. The dietary fish trials also suggest a reduction in mortality and reduced arrhythmia, supporting the theory that fish-based n-3 PUFAs may impart their cardioprotective effect by acting as an antiarrhythmic agent. They may do so by stabilizing the electrical activity of heart muscle cells or by decreasing the heart rate. The trials of ALA supplements and ALA-enriched diets, including walnut, soybean, or flaxseed oil, were less reliable, but showed possible benefits in reducing mortality. The review concludes that the evidence suggests a role for fish oil (EPA, DHA) or fish in secondary prevention, as clinical trial data demonstrate a significant reduction in total mortality, coronary heart disease death, and sudden death. However the data on ALA is limited by studies of limited quality. Several previous studies have suggested that n-3 PUFAs reduce heart attack risk through benefiting endothelial function (cells of blood vessel walls), reducing inflammation, and the risk of thrombosis (blood clotting). The American Heart Association has published guidelines for patients with CHD recommending a consumption of fish and fish oil, totaling 1g/day of EPA and DHA. / Harper, C.R. and Jacobson, T.A. Usefulness of Omega-3 Fatty Acids and the Prevention of Coronary Heart Disease. American Journal of Cardiology, Vol. 96, December 2005, pp. 1521-29/

### **Eating fish may lower inflammation in the blood vessels**

ATHENS, GREECE. Consuming fish has long been thought to help protect against heart disease, possibly through reducing inflammation in blood vessels. However, study results on the effects of fish on inflammatory markers are mixed, so a team of researchers from Harokopio University set out to examine the relationship in a population-based group of men and women free of heart disease. They gathered data on 1,514 men and 1,528 women aged 18 to 89, taking part in the ongoing ATTICA study into the benefits of a Mediterranean diet on heart health. Compared to those who did not eat fish, those who ate the most (10.5 ounces per week or more) had an average 33 per cent lower level of C-reactive protein, a widely-used marker for inflammation. They also had a 33 per cent lower level of interleukin-6, another inflammatory marker found in the plasma. This group had 21 per cent lower tumor necrosis factor-alpha, which affects lipid metabolism, coagulation, and insulin resistance, and 28 per cent lower serum amyloid A, a blood protein increased by inflammation. Significantly lower levels of these markers were also found in people who ate about 5 to 10 ounces of fish per week. This clear and strong inverse association between fish consumption and inflammatory markers may help explain why people who eat fish tend to have lower rates of heart disease, say the authors. The benefits remained once many risk factors were taken into account and were observed even in people with high

blood pressure or diabetes, but not high cholesterol. Nevertheless, it was a cross-sectional study which did not follow people over time, so cannot prove causation. These results support recommendations that people eat more fish, the authors write, particularly oily fish with their high levels of omega-3 fatty acids. One or two portions per week may be sufficient, but the fish should not be fried. In some cases, omega-3 fatty acid supplements may be appropriate to achieve an optimal intake of 0.6 grams of omega-3 fatty acids per day. / Zampelas, A. et al. Fish consumption among healthy adults is associated with decreased levels of inflammatory markers related to cardiovascular disease: The ATTICA Study. *Journal of the American College of Cardiology*, Vol. 46, July 2005, pp. 120-24/

## **Fish oils and atrial fibrillation**

AARHUS, DENMARK. There is impressive evidence that fish oils (eicosapentaenoic acid [EPA] and docosahexaenoic acid [DHA]) can materially reduce the risk of sudden cardiac death (cardiac arrest). Researchers at the University of Washington found that men and women who consumed fatty fish just once a week reduced their risk of cardiac arrest by 50%. They believe that fatty fish consumption increases the levels of EPA and DHA in the membranes of red blood cells, which in turn, reduces platelet aggregation and the risk of fatal ventricular arrhythmias. Other researchers have confirmed the protective effect of fish oils against ventricular fibrillation, but very few, if any, studies have investigated the association between fish/fish oil intake and the development of atrial fibrillation. A group of Danish researchers recently set out to fill in this gap in our knowledge. Their study included 22,528 men and 25,421 women (average age of 56 years) who were free of endocrine and cardiovascular diseases at baseline. All participants completed a detailed semi-quantitative food- and drink-frequency questionnaire and were then followed for an average of 5.7 years. At the end of the follow-up period 374 men (1.7%) and 182 women (0.7%) had been diagnosed with either atrial fibrillation or atrial flutter. About 10% of all participants were being treated for hypertension. Somewhat surprisingly, the researchers found that participants with a high consumption of fatty fish (herring, mackerel, sardines, trout, and salmon) had a significantly higher incidence of new-onset atrial fibrillation than did participants who rarely or never ate oily fish. After adjusting for age, gender, height, BMI, smoking, alcohol consumption, total daily energy intake, systolic blood pressure, treatment for hypertension, cholesterol level, and level of education, the researchers concluded that participants whose daily fish oil intake averaged 1290 mg had a 34% greater risk of developing AF than did those whose intake averaged only 160 mg/day. The difference was statistically significant ( $p=0.006$ ). The researchers point out that the lack of an observed beneficial effect could have been because the consumption of fish oil was insufficient to prevent arrhythmias. They also say, "We cannot exclude the possibilities that fish oil may prevent the development of atrial fibrillation in patients with symptomatic heart disease or that fish oil may prevent relapses of atrial fibrillation in patients with paroxysmal atrial fibrillation." Finally, they point out that they did not collect information regarding the use of fish oil supplements and also emphasize that they do not know whether fish oil would have a protective effect against the development of AF in populations with a low intake of fatty fish (such as the United States). Their overall conclusion was that, "Consumption of omega-3 fatty acids from fish is not associated with a reduction in the risk of developing atrial fibrillation or flutter." / Frost, L and Vestergaard, P. n-3 fatty acids consumed from fish and risk of atrial fibrillation or flutter: the Danish Diet, Cancer, and Health Study. *American Journal of Clinical Nutrition*, Vol. 81, January 2005, pp. 5-54 / \*Editor's comment:\* The conclusions of the Danish study are fully in line with the results of the two LAF surveys, which investigated the association between afib severity and fish oil intake. None of our surveys have ever found that a high fish oil intake is associated with fewer or shorter episodes. This, as pointed out by the Danish researchers, could be due to the fact that the fish oil intake was not high enough to provide a benefit. However, this would seem unlikely since the highest intakes were well above those required to provide excellent protection against ventricular fibrillation. The finding that heavy fish consumers have a statistically significant 34% greater risk of developing atrial fibrillation or flutter is worth noting. It is possible that this could be due to the higher mercury intake associated with higher fish consumption. Several studies have

shown that people with a high consumption of certain fish have higher mercury levels in their blood and toenails. The lesson here is that the safest way to obtain a high intake of EPA and DHA is through the consumption of a high quality, molecular distilled fish oil supplement. In conclusion then, even though there may be no scientific evidence that fish oils can prevent the development of AF, there are still numerous reasons for ensuring an adequate intake (1- 2 grams/day). The evidence that they help prevent cardiac arrest, reduce triglyceride levels, combat inflammation, and help prevent stroke and heart attack makes fish oils a must supplement for all, whether an afibber or not.

## Determination of omega-3 fatty acids in heart tissue

KANSAS CITY, MISSOURI. There is overwhelming evidence that omega-3 fatty acids or, more specifically, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), the main components of fish oils, are highly effective in preventing sudden cardiac death, death from heart disease, and certain arrhythmias. Investigations involving individual heart cells have shown that EPA + DHA prolong the refractory state of the cells by interacting with fast-acting sodium channels and L-type calcium channels. It is thus clear that the cardioprotective effect of EPA + DHA is intimately associated with the degree to which these two fatty acids are actually incorporated into the heart tissue (myocardium). The ultimate test of the extent of incorporation is, of course, analysis of the heart tissue itself; however this, for obvious reasons, is not terribly practical. Researchers at the Mid America Heart Institute now report that the EPA + DHA content of red blood cells (RBCs) almost exactly mirrors the concentration in the myocardium. Their study involved 20 heart transplant patients whose EPA + DHA level was measured in heart tissue and red blood cells. The researchers found an almost perfect correlation ( $r = 0.82$ ) between the content in cardiac tissue and the content of RBCs. In a subsequent experiment involving 25 heart transplant patients, the researchers measured EPA + DHA in biopsied myocardial tissue, plasma lipids, cells scraped from the cheek (buccal tissue), and red blood cells before and after 6 months of supplementation with 300 mg EPA + 200 mg DHA. The supplementation resulted in a 272% increase in EPA and a 94% increase in DHA in the heart tissue itself. The corresponding increases in plasma lipids, buccal tissue, and RBCs were 365% and 104%, 124% and 95%, and 279% and 84% respectively. The best correlation was between myocardial tissue and RBCs followed by myocardial tissue and buccal tissue. The researchers conclude that EPA and DHA levels in RBCs give an accurate indication of the content in heart cells. Buccal tissue is also a good indicator, but more cumbersome and exacting to obtain than a blood sample. The researchers also point out that RBC content is a good indicator of long-term intake, whereas plasma lipids vary depending on the food consumed on the day immediately preceding the test. / Harris, WS, et al. Omega-3 fatty acids in cardiac biopsies from heart transplantation patients: correlation with erythrocytes and response to supplementation. *Circulation*, Vol. 110, September 21, 2004, pp. 1645-49/

## Fish oils recommended for heart disease prevention

DALLAS, TEXAS. The American Heart Association has reviewed the benefits of regular consumption of fish and fish oils. The review concludes that fish and fish oils help prevent cardiovascular disease including fatal and non-fatal heart attacks, strokes, sudden cardiac death, and coronary artery disease (angina). The reviewers believe that the mechanisms by which fish oils exert their protective effect include: \* Reduction in susceptibility to ventricular arrhythmia \* Decrease in platelet aggregation \* Reduction in triglyceride levels \* Retardation of atherosclerosis \* Lowering of blood pressure \* Promotion of nitric oxide induced endothelial relaxation \* Anti-inflammatory effects. Fish and fish oils contain long-chain polyunsaturated omega-3 fatty acids, more specifically, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). The average American diet contains only about 100-200 mg/day of EPA and DHA. The diet also contains

about 1.4 grams/day of alpha- linolenic acid mainly from canola and soybean oils. Alpha-linolenic acid can be converted in the body to EPA and DHA, but not in amounts sufficient to make a significant impact. Some studies have shown that alpha-linolenic acid, on its own, may have heart-protective effects, but other studies have failed to confirm this. NOTE: Flax seed oil is a particularly rich source of alpha-linolenic acid. The American Heart Association recommends that people increase their intake of long-chain polyunsaturated omega-3 oils from fish or directly from fish oil supplements. Healthy people should consume oily fish at least twice a week. Patients with heart disease should eat enough oily fish on a daily basis to obtain about 1 gram per day of EPA and DHA combined or take a fish oil supplement providing 1 gram per day of EPA + DHA. Patients with high triglyceride levels should receive 2-4 grams/day of EPA+DHA under the care of a physician. The reviewers point out that many fish species contain significant amounts of methylmercury, polychlorinated biphenyls (PCBs), dioxins, and other environmental contaminants and therefore must be consumed in moderation, if at all, especially by children and pregnant and lactating women. Poorer quality fish oils may also contain these contaminants, so it is important to only supplement with highly purified, pharmaceutical grade oils. / Kris-Etherton, PM, et al. Fish consumption, fish oil, omega-3 fatty acids, and cardiovascular disease. *Circulation*, Vol. 106, November 19, 2002, pp. 2747-57/

## Antiarrhythmic properties of fish oils

CHIETI, ITALY. Several large clinical trials have confirmed the ability of fish oils to prevent sudden cardiac death in both presumably healthy subjects as well as in patients having suffered a heart attack (myocardial infarction). Considering that sudden cardiac death, largely caused by ventricular fibrillation, accounts for somewhere between 250,000 and 300,000 deaths every year in the US alone, it is clearly highly significant that a diet rich in oily fish or fish oil supplements may reduce the incidence of sudden cardiac death by up to 45%. Researchers at the universities of Chieti and Pisa recently published a review of the current "state-of-the-art" in regard to fish oils and arrhythmias. Highlights are: \* Supplementation with fish oils shows its beneficial effect within a few weeks. \* It is unlikely that the biological effects of fish oils would vary depending on source (oily fish or fish oil supplement). \* Animal experiments have shown that fish oils act on individual myocytes (heart cells) to inhibit the excitatory Na<sup>+</sup> current, stabilize the inactivated state of the Na channel, and prolong the effective refractory period of the cardiac cycle. The L-type Ca<sup>++</sup> current is also inhibited by fish oils and the outward flow of K<sup>+</sup> is reduced. All effects which would reduce the tendency to arrhythmia either by decreasing automaticity or by interfering with re-entry circuits. \* Two small trials have shown a reduction in PVCs (premature ventricular complexes) with fish oil supplementation. In one of these trials 34 participants with frequent PVCs, but no life-threatening arrhythmias were given 2.4 grams/day of fish oils while the control group was given sunflower seed oil which is rich in linoleic acid (an omega-6 fatty acid). PVCs decreased by 48% in the fish oil group as compared to 25% in the sunflower seed group. \* Fish oils have been shown to decrease heart rate variability and there is some suggestion that they may also reduce sympathetic and increase parasympathetic (vagal) activity in the autonomic nervous system. \* Prostaglandins and thromboxane A<sub>2</sub>, produced from arachidonic acid, are mostly proarrhythmic so a high intake of omega-6 fatty acids may be detrimental. Although most research, so far, has focused on the effect of fish oil on life-threatening ventricular arrhythmias it is likely that many of the findings may also be applicable to atrial fibrillation. / De Caterina, Raffaele, et al. Antiarrhythmic effects of omega-3 fatty acids: from epidemiology to bedside. *American Heart Journal*, Vol. 146, September 2003, pp. 420-30/

## Fish consumption lowers heart rate

LILLE, FRANCE. There is increasing evidence that an elevated heart rate is associated with an increased risk of sudden cardiac death. In the Paris Prospective Study, which included more than

7700 men followed up for 23 years, the mean difference between controls and patients who died suddenly from cardiac arrest was 4.1 beats per minute. A group of European researchers now reports that regular fish consumption can lower heart rate by as much as 2 bpm. Their study included 9758 men aged 50 to 59 years from four European cities (Belfast, Lille, Strasbourg, and Toulouse). Twenty-seven per cent of the men consumed fish less than once per week, 47% consumed fish once a week, 20% twice a week, and the remaining 6% more than twice a week. The average heart rate (adjusted for age, physical activity, smoking, alcohol consumption, etc) was 67.5 bpm in men consuming fish less than once per week and 65.6 bpm in men consuming fish more than twice per week. Fish consumers also had lower triglyceride levels, lower blood pressure (both systolic and diastolic), and higher levels of beneficial HDL cholesterol than did non-consumers. The erythrocyte content of DHA (docosahexaenoic acid) in the blood was found to be inversely correlated with heart rate. The researchers point out that there is considerable evidence that omega-3 fatty acids such as those found in fish and fish oils stabilize the electrical activity of heart cells by elevating the action potential threshold and prolonging the relative refractory time. There is also evidence that a high omega-3 content of blood cells and serum cholesterol esters is associated with increased heart rate variability. A higher heart rate variability has been associated with a decreased risk of cardiac disease and a longer lifespan. / Dallongeville, Jean, et al. Fish consumption is associated with lower heart rates. *Circulation*, Vol. 108, August 19, 2003, pp. 820-25/

## Older people benefit from fish oils

SEATTLE, WASHINGTON. There is abundant evidence that a diet rich in fatty fish is highly protective against death from heart disease in people 65 years of age and younger. Now researchers at the University of Washington and the Fred Hutchinson Cancer Research Center have extended the evidence to include people with an average age of 78 years. Their study included 54 men and women who had suffered a fatal heart attack or other fatal ischemic heart disease event, 125 people who had suffered a non-fatal heart attack, and 179 matched controls. All study subjects had blood samples drawn about 2 years prior to the cardiovascular event. The phospholipid phase of the blood plasma was isolated and analyzed for its contents of the fatty acids eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA), alpha-linolenic acid (ALA), and linoleic acid (LA). EPA and DHA are the main constituents of fish oil, ALA is found in canola, flax and soybean oils, and LA is a main constituent of safflower and cottonseed oils. The researchers found that subjects with a high phospholipid content of EPA + DHA had a 70% lower incidence of fatal heart disease than did those with a lower level (4.1% versus 3.3% of total fatty acids). Participants with a high level of ALA had a 50% reduced risk of fatal heart disease. Subjects with a high level of LA, on the other hand, had a 2.4 times higher incidence of fatal heart disease than did those with a lower level. There was no association between the levels of the fatty acids and the incidence of non-fatal heart attacks. The researchers ascribe this to the fact that EPA and DHA (and perhaps ALA) are known to prevent ventricular arrhythmias ? the main factor in sudden cardiac death. Ventricular arrhythmias are not involved in non-fatal heart attacks. The researchers conclude that their findings lend further support to the recommendation from the American Heart Association to consume 2 fish meals (preferably fatty fish) per week. Dr. William Harris of the University of Missouri, in commenting on the results, suggests that a combined daily intake of 1 gram of EPA + DHA is both safe and prudent, but that supplementation with fish oil capsules may be required to achieve this goal. / Lemaitre, RN, et al. n-3 polyunsaturated fatty acids, fatal ischemic heart disease, and nonfatal myocardial infarction in older adults: the Cardiovascular Health Study. *American Journal of Clinical Nutrition*, Vol. 77, February 2003, pp. 319-25 Harris, WS. n-3 long-chain polyunsaturated fatty acids reduce risk of coronary heart disease death: extending the evidence to the elderly. *American Journal of Clinical Nutrition*, Vol. 77, February 2003, pp. 279-80 (editorial)/

## Fish oils: a must for heart attack survivors

SANTA MARIA IMBARO, ITALY. A group of Italian researchers (GISSI) reported in 1999 that supplementation with fish oil reduces the mortality among patients who have survived a first heart attack. Their study involved over 11,000 heart attack survivors who supplemented with 1 gram/day of fish oil (580 mg of eicosapentaenoic acid [EPA] and 290 mg of docosahexaenoic acid [DHA]) for 3.5 years. The researchers have now re-analyzed their data in an attempt to determine how the fish oil exerts its protective effect. The reduced mortality was apparent after only three months of supplementation (1.1 per cent versus 1.6 per cent in the placebo group) and continued for the duration of the study. The reduction in the incidence of sudden cardiac death accounted for about 57 per cent of the total improvement in mortality rates. At the end of the study 2.7 per cent of the placebo group participants had died from sudden cardiac death as compared to only 2.0 per cent in the fish oil group. Overall, cardiovascular death (including stroke) at the end of the study was 6.5 per cent in the placebo group versus 5.5 per cent in the fish oil group. There was no statistical significant difference in the incidence of non-fatal heart attacks between the fish oil and placebo groups. The researchers conclude that fish oils exert their protective effect by preventing fatal ventricular arrhythmias rather than through an improvement in cholesterol profile. They did note a small (4.6 per cent) drop in triglyceride levels in the fish oil group, but found no significant differences in LDL (low-density lipoprotein) and HDL (high-density lipoprotein) cholesterol between the two groups. They also point out that the number of lives (per 1000 patients) which could be saved every year by giving heart attack survivors fish oil exceeds the number of lives (per 1000 patients) estimated to be saved by treating heart disease patients with high cholesterol levels with pravastatin. This puts fish oils squarely in the category of highly effective heart drugs? / Marchioli, Roberto, et al. Efficacy of n-3 polyunsaturated fatty acids after myocardial infarction: results of GISSI-Prevenzione trial. *Lipids*, Vol. 36, Supplement 2001, pp. S119-S126 Marchioli, Roberto, et al. Early protection against sudden death by n-3 polyunsaturated fatty acids after myocardial infarction: time-course analysis of the results of GISSI-Prevenzione. *Circulation*, Vol. 105, April 23, 2002, pp. 1897-1903 Leaf, Alexander. On the reanalysis of the GISSI-Prevenzione. *Circulation*, Vol. 105, April 23, 2002, pp. 1874-75 (editorial) / \*New risk factor for sudden death\* PARIS, FRANCE. Sudden cardiac death is a common occurrence in industrialized countries. There is evidence that a high level of free fatty acids in the blood plasma is an independent risk factor for ventricular arrhythmias and sudden death in people who have suffered a heart attack. Medical researchers at the University of Paris now report that a high level of circulating free fatty acids (non-esterified) is also a potent risk factor for sudden death in men without cardiovascular disease. The study involved 5250 men, aged 42 to 53 years at the start of the study in 1967-72. All participants were free of cardiovascular disease at the time of entry. The men were followed for an average of 22 years during which 1601 deaths occurred ? 91 of them were classified as sudden cardiac deaths and 145 as fatal heart attacks. Analysis of test data showed that the level of free fatty acids circulating in the blood plasma is a potent risk factor for sudden death. Men with a high level had a 70 per cent higher risk than did men with a low level. Surprisingly, high fatty acid levels were not a risk factor for fatal heart attack. Other prominent risk factors for sudden death were parental sudden death, parental heart attack, smoking, high systolic blood pressure, and high body mass index (obesity). High cholesterol levels increased the risk of sudden death by a relatively modest 18 per cent. The researchers and Dr. Alexander Leaf, MD of the Harvard Medical School point out that not all fatty acids are detrimental. There is ample evidence that the omega-3 fatty acids, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), the main components of fish oil are actually highly protective against sudden cardiac death. Dr. Leaf believes that it is the omega-6 fatty acids found in vegetable oils (corn, safflower, sunflower, and peanut) that are responsible for initiating the arrhythmias leading to sudden death. Fish oils, on the other hand, exert a protective effect in amounts as low as 600-1000 mg/day (EPA+DHA). Dr. Leaf points out that government agencies and heart associations have long been advocating an increased intake of polyunsaturated fatty acids without making any distinction between omega-6 essential fatty acids which appear to promote sudden death and omega-3 fatty acids (EPA and DHA) which prevent it. / Jouven, Xavier, et al. Circulating nonesterified fatty acid level as a predictive risk factor for

sudden death in the population. *Circulation*, Vol. 104, August 14, 2001, pp. 756-61 Leaf, Alexander. Plasma nonesterified fatty acid concentration as a risk factor for sudden cardiac death: the Paris prospective study. *Circulation*, Vol. 104, August 14, 2001, pp. 744-45 (editorial)/

## The brain-heart connection

NORWOOD, MASSACHUSETTS. Dr. U.N. Das, MD of EFA Sciences LLC provides a fascinating overview of the many benefits of EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid), the main components of fish oils. Dr. Das points out that an excess of tumor necrosis factor alpha (TNF) is involved in not only coronary heart disease, but also in many inflammatory diseases such as ulcerative colitis, Crohn's disease, rheumatoid arthritis, systemic lupus erythematosus, and septic shock. An increased intake of fish oils suppresses TNF production ? a possible explanation for their beneficial effects. EPA and DHA also have a direct effect on the central nervous system. It is suggested that they increase brain levels of acetylcholine and activate the parasympathetic branch of the autonomous nervous system. This in turn leads to increased heart rate variability and a commensurate reduction in the risk of ventricular arrhythmias and sudden cardiac death. Dr. Das points out that the effect of fish oils in this respect is very similar to those obtained by exercise. EPA and DHA also act directly on individual heart muscle cells (myocytes) to suppress their tendency to go into spontaneous arrhythmia. Dr. Das emphasizes that it is important to ensure the availability of adequate amounts of arachidonic acid and dihomo-gamma-linolenic acid in the diet in order to obtain the full benefits of fish oils as preventers of arrhythmias. He also makes the intriguing observation that EPA and DHA can block the entry of sodium and calcium ions into vascular smooth muscle cells; this may be another mechanism by which fish oils help prevent ventricular arrhythmias and sudden cardiac death. Finally, Dr. Das points out that different individuals may need different doses of EPA/DHA in order to achieve their heart protective effect. [143 references] / Das, U.N. Beneficial effect(s) of n-3 fatty acids in cardiovascular diseases: but, why and how? *Prostaglandins, Leukotrienes and Essential Fatty Acids*, Vol. 63, December 2000, pp. 351-62 / \*Fish oils help prevent sudden cardiac death\*

AALBORG, DENMARK. Sudden cardiac death (SCD) is now the most common cause of death in the Western world. SCD is often caused by ventricular arrhythmias in patients with heart disease, but may also occur among previously healthy people. The risks of arrhythmias and SCD are closely tied in with heart rate variability (HRV) with a high variability index corresponding to a lower risk. It would also appear that the risk of SCD can be substantially reduced by an increased consumption of fish. Some very recent research has shown that survivors of a first heart attack can avoid having a second one by supplementing with fish oils. An obvious question is whether there is a connection between heart rate variability and fish oil intake. Danish researchers at the Aalborg Hospital are convinced that there is indeed a very close connection - at least in men. Their recently released study involved 25 women and 35 men who were generally healthy and took no medications. The participants were randomized into three groups. Group 1 was given 10 fish oil capsules daily providing a total of 6.6 grams of n-3 polyunsaturated fatty acids (3.0 g eicosapentaenoic acid [EPA] and 2.9 g docosahexaenoic acid [DHA]); group 2 was given three fish oil capsules (0.9 g EPA and 0.8 g DHA) plus seven olive oil capsules daily, and group 3, the control group, was given 10 olive oil capsules daily. The study participants gave fasting blood samples and had their HRV measured with a Holter recorder for 24 hours at the start of the study and after 12 weeks of supplementation. The researchers found that fish oil supplementation significantly increased the concentration of EPA and DHA in both blood platelets and granulocytes and that this increase was highly dose-dependent. They also found a significant, dose-dependent reduction in triacylglycerols, but no significant changes in total, LDL or HDL cholesterol levels. The 24-hour Holter recordings showed a correlation between heart rate (pulse rate) and blood level of EPA and DHA with a higher level corresponding to a lower pulse rate in both men and women. There was also a very significant association between DHA level in men and SDNN. SDNN (the standard deviation of all normal R-R intervals during the 24-hr Holter recording) is an important index of HRV with higher values indicating greater heart rate variability. The researchers conclude that supplementation with fish oils, especially DHA, may help prevent

arrhythmias and sudden cardiac death in healthy men. They found no association between EPA/DHA levels in women and HRV, but urge further studies to confirm this seeming lack of effect. / Christensen, Jeppe Hagstrup, et al. Heart rate variability and fatty acid content of blood cell membranes: a dose-response study with n-3 fatty acids. *American Journal of Clinical Nutrition*, Vol. 70, September 1999, pp. 331-37/

## **Omega-3 fatty acids: the missing link?**

BERLIN, GERMANY. Dr. Emanuel Severus of the Berlin University points out that major depression is characterized by a deficiency of omega-3 fatty acids and that these acids possess powerful antiarrhythmic properties. He suggests that the missing link in the recently established association between major depression and sudden cardiac death may be the omega-3 fatty acid deficiency which characterizes both conditions. / Severus, W. Emanuel, et al. Omega-3 fatty acids: the missing link? *Archives of General Psychiatry*, Vol. 56, April 1999, pp. 380-81 (letter to the editor)/

## **Eat fish and live longer**

BOSTON, MASSACHUSETTS. There is a growing consensus that regular fish consumption protects against heart disease. There is, however, still controversy as to whether this protection applies to all forms of heart disease and it is also not clear how fish exerts its protective effect. Some studies have found that fish consumption protects only against sudden cardiac death while others have found that it protects only against nonsudden death. Now researchers at the Harvard Medical School and the Brigham and Women's Hospital weigh in with a comprehensive new study which concludes that even modest fish and shellfish consumption protects against sudden cardiac death in men and significantly reduces total mortality. The study involved over 20,000 male American physicians who were between the ages of 40 and 84 years in 1982 when the study commenced. Food frequency questionnaires were administered after 12 and 18 months and again in 1988. By December 1995 133 of the participants had died from a sudden cardiac event (death occurring within one hour from onset of symptoms). Analysis of the collected data showed that the men who consumed fish once or more each week had a 52 per cent lower risk of dying from a sudden cardiac event than did the men who ate fish less than once a month. This lower risk applied after adjusting for all other known risk factors. The estimated dietary intake of marine n-3 fatty acids also correlated well with the risk of sudden cardiac death with an intake of more than 300 mg/month providing significant protection. The extent of protection did not increase significantly with greater fish or marine n-3 fatty acid intake indicating that eating fish once a week is sufficient to provide worthwhile protection. Fish consumption was not associated with the risk of nonsudden death, total myocardial infarction or total deaths from cardiovascular diseases. There was, however, a 30 per cent decrease in the overall mortality among the men consuming fish once or more each week as compared to the men eating fish less than once per month. The researchers speculate that fish consumption may exert its protective effect by preventing fatal arrhythmias. They suggest that the n-3 fatty acids found in fish and shellfish (eicosapentaenoic acid and docosahexaenoic acid) are responsible for the antiarrhythmic properties and point out that alpha-linolenic acid, an n-3 fatty acid found in flax oil and nuts, also has antiarrhythmic properties. They did not investigate the benefits of fish oil supplements and purposely excluded 777 physicians from the study who were taking fish oil supplements. The researchers conclude that eating fish once per week may substantially reduce the risk of sudden cardiac death. In an accompanying editorial Dr. Daan Kromhout of the Dutch National Institute of Public Health concurs with this conclusion and adds that patients already suffering from cardiac disease should be advised to eat fish twice a week. / Albert, Christine M., et al. Fish consumption and risk of sudden cardiac death. *Journal of the American Medical Association*, Vol. 279, January

7, 1998, pp. 23-28 Kromhout, Daan. Fish consumption and sudden cardiac death. Journal of the American Medical Association, Vol. 279, January 7, 1998, pp. 65-66 (editorial)/

## **Fish oils protect against arrhythmias**

AALBORG, DENMARK. Research has shown that heart attack survivors who increase their intake of oily fish considerably improve their chance of long-term survival. Now Danish researchers report that daily supplementation with fish oil capsules may have a similar effect. Their experiment involved 49 patients who had been discharged from hospital after suffering a heart attack. The study participants were randomly allocated to receive 5 grams per day of fish oil as a mixture of eicosapentaenoic acid and docosahexaenoic acid or a similar amount of olive oil as a placebo for a 12-week period. A 24-hour recording (Holter) of their heart rate was obtained at the start and end of the study. At the end of the experiment the patients in the fish oil group exhibited a marked increase in the variability of their heart rate as compared to the controls. It is believed that greater heart rate variability is desirable in heart attack patients as it protects the heart against often fatal ventricular arrhythmias. The researchers conclude that fish oils may have an antiarrhythmic effect which could account for the better survival among heart attack patients who increase their intake of them. / Christensen, Jeppe Hagstrup, et al. Effect of fish oil on heart rate variability in survivors of myocardial infarction. British Medical Journal, Vol. 312, March 16, 1996, pp. 677-78/

## **Fish oils help prevent cardiac arrest**

SEATTLE, WASHINGTON. Cardiac arrest is a serious, usually fatal condition in which the heart stops pumping. Cardiac arrest most commonly occurs in connection with ventricular fibrillation and its primary cause is a heart attack. Researchers at the University of Washington now report that the risk of cardiac arrest can be significantly lowered by an increased intake of seafood rich in eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Their study involved 334 patients who had suffered cardiac arrest during the period 1988 to 1994 and 493 controls matched for age and sex. None of the study participants had had any indication of heart disease prior to the beginning of the study. Interviews with survivors or their spouses were used to determine the participant's fish intake in the month preceding the cardiac arrest. The researchers found that the intake of just one portion of fatty fish per week lowered the risk of cardiac arrest by an impressive 50 per cent after adjusting for age, smoking, family history of heart attacks, hypertension, diabetes, obesity, physical activity, education, and cholesterol level. The researchers believe that consumption of fish increases the level of EPA and DHA in the membranes of the red blood cells which in turn reduces platelet aggregation and coronary spasm. This belief was confirmed by finding that blood samples taken from 95 cardiac arrest patients and 133 controls showed that a high blood content of EPA and DHA (five per cent of total fatty acids) corresponded to a 70 per cent reduction in the risk of cardiac arrest when compared to study participants with a low EPA and DHA content in their blood (3.3 per cent of total fatty acids). Other studies have shown that patients who have already suffered a heart attack can reduce their risk of future life-threatening arrhythmias and sudden cardiac death by increasing their intake of fish, fish oils or linolenic acid (flax seed oil). The researchers conclude that a modest intake of EPA and DHA from seafood may reduce the risk of ventricular fibrillation and death from coronary heart disease. NOTE: Fresh salmon is one of the best sources of fish oils; it contains twice as much per serving as does albacore tuna and six times more EPA and DHA than a serving of cod. / Siscovick, David S., et al. Dietary intake and cell membrane levels of long-chain n-3 polyunsaturated fatty acids and the risk of primary cardiac arrest. Journal of the American Medical Association, Vol. 274, No. 17, November 1, 1995, pp. 1363-67/ Coromega  
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