

## Health Benefits of Fish Oils

### Summaries of the latest research concerning the health benefits of fish and fish oil

#### Polyunsaturated fatty acids don't compete over benefits

BOSTON, MASSACHUSETTS. Polyunsaturated fatty acids (PUFAs) are effective at reducing heart disease risk, but fears have been raised that n-6 PUFAs may interfere with the metabolism of n-3 PUFAs. However, new evidence from Harvard Medical School will help put these fears to rest. Researchers studied the links between various PUFA intakes and the incidence of coronary heart disease (CHD) in 45,722 men enrolled in the Health Professionals Follow-up Study. A reliable food-frequency questionnaire was given at the start and completed every four years to determine PUFA intakes. During the 14 years of follow-up, there were 218 sudden deaths, 1,521 nonfatal myocardial infarctions (MIs) and 2,306 total CHD events (combined sudden death, other CHD deaths, and nonfatal MI) among the participants. Dietary analysis showed that both seafood-derived long-chain and plant-derived intermediate-chain n-3 PUFA intakes were linked to a reduced CHD risk, regardless of n-6 PUFA intake. Men who consumed more than 250 mg seafood-based n-3 PUFA per day had a 40-50 per cent lower risk of CHD. The researchers also looked at the relationship between seafood-based n-3 PUFAs and plant-based n-3 PUFAs. They found that when seafood-based n-3 PUFA intake is low (less than 100 mg per day), plant-based n-3 PUFAs are particularly effective at reducing CHD risk. For every additional 1 g of plant-based n-3 PUFA per day, MI risk was reduced by 58 per cent and total CHD risk was reduced by 47 per cent. Contrary to previous findings, this study found no links between overall CHD risk and intake of n-6 PUFAs. The results suggest that a modest dietary intake of seafood (250 mg, equaling around 1-2 oily fish meals a week) may lower the risk of CHD, irrespective of n-6 PUFA intake. The authors concluded that plant sources of PUFAs are especially important in populations with limited access to, or consumption of seafood. / Mozaffarian D et al. Interplay between different polyunsaturated fatty acids and risk of coronary heart disease in men. *Circulation*, Vol. 111, January 2005, pp.157-164/

#### 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/ \*Fish oils benefit patients with lupus\*

BELFAST, NORTHERN IRELAND. Systemic lupus erythematosus (SLE) is a chronic inflammatory disease. It can manifest itself via a photosensitive facial rash, fatigue, anorexia, weight loss, and night sweats and can progress to life-threatening involvement of the heart, lungs, kidneys or central nervous system. Flare-ups of SLE are typically followed by periods of clinical remission. Fish oils and copper have both been found useful in the treatment of other inflammatory diseases, so researchers at the University of Ulster decided to see if supplementation with one or both of these would help alleviate SLE symptoms. Their clinical trial involved 52 SLE patients who were randomly assigned to receive 3 grams/day of fish oil providing 540 mg/day of EPA (eicosapentaenoic acid) and 360 mg/day of DHA (docosahexaenoic acid), 3 mg/day of copper in the form of a copper di-glycinate amino acid complex, both fish oil and copper, or a placebo. The study lasted 24 weeks and participants were assessed at baseline, 6, 12 and 24 weeks. The researchers found that disease activity at 24 weeks, as measured by the SLAM-R score, was significantly less in the groups that had supplemented with fish oil than in the placebo and copper only groups. They conclude that supplementation with fish oil may be effective in favourably modifying the symptomatic disease activity in SLE. / Duffy, EM, et al. The clinical effect of dietary supplementation with omega-3 fish oils and/or copper in systemic lupus erythematosus. Journal of Rheumatology, Vol. 31, August 2004, pp. 1551-56/ \*Lifespan and fatty acids\*

Australian researchers have just released the results of a fascinating study which links longevity with the fatty acid composition of cell membranes. They discovered animals that have a preponderance of saturated fatty acids in their membranes have a slower metabolism and live far longer than animals that have lots of polyunsaturated fats in their membranes. The key fatty acid would seem to be the highly polyunsaturated docosahexaenoic acid (DHA), a major component of fish oils. It turns out that cell membranes rich in DHA are a lot more fluid than membranes rich in saturated fatty acids. This results in a faster metabolism and quicker reaction times all around, especially in the brain and eyes. Unfortunately, DHA is also an easy target for free radicals that leak out of mitochondria as they produce energy. The end result is that fluid, unsaturated membranes deteriorate and age faster than more viscous, saturated ones. Free radical attacks can also damage proteins and DNA. On the other hand, a shortage of DHA in cell membranes can lead to serious problems like high blood pressure, heart disease, diabetes, and depression. So you guessed it you can't win! About the only proven way of increasing longevity is by restricting calorie intake which apparently removes some DHA from membranes. / Fox, Douglas. The speed of life. New Scientist, November 1, 2003, pp. 42-45/ \*Fish oil versus flax oil\*

BETHESDA, MARYLAND. There is considerable evidence that fish and fish oils are beneficial to heart health, reduce the risk of cancer, and benefit mental health. The active components of fish oils are eicosapentaenoic acid (EPA), a polyunsaturated fatty acid with 20 carbon atoms in its backbone, and docosahexaenoic acid (DHA), a polyunsaturated fatty acid with 22 carbon atoms. Both are members of the omega-3 group of essential fatty acids. EPA and DHA are found exclusively in marine animals; fatty fish such as herring, sardines, salmon and fresh tuna are the best sources. Alpha-linolenic acid (ALA) is another omega-3 fatty acid found in flaxseed and flaxseed oil. ALA has 18 carbon atoms in its backbone and can be converted to EPA in the body (in the liver) by the addition of two carbon atoms. EPA, in turn, can be converted to DHA. Because the typical American diet is relatively low in fish intake ALA becomes a crucial source of the EPA and DHA required for optimum health. Researchers at the National Institutes of Health have just completed a study designed to determine just how much ALA is actually converted to EPA in the body. Their study included eight healthy subjects who were fed a standard diet for

three weeks and then given one gram of ALA labeled with an isotope tracer. The diet was beef-based in order to avoid extraneous sources of EPA and DHA. The researchers measured blood plasma concentrations of ALA, EPA and DHA 8, 24, 48, 72, 96 and 168 hours after ingestion of the labeled ALA. The results show that only about 0.2 per cent of the ALA (2 mg) was actually converted to EPA. In contrast, about 23 per cent of the EPA was available for conversion to DHA. The researchers also noted that the half-life (the time it takes to reduce initial concentration by 50 per cent) of ALA in blood plasma was quite low at about one hour. In comparison, the half-life of EPA was 67 hours and that of DHA 20 hours. The researchers conclude that ALA is not a viable source of EPA and DHA and cannot replace fish and fish oils in the diet. \*Editor's Note:\* According to this new data a tablespoon of flax oil would only result in the synthesis of about 30 mg of EPA ? far less than the recommended daily intake of 220 mg. / Pawlosky, Robert J. Physiological compartmental analysis of alpha-linolenic acid metabolism in adult humans. Journal of Lipid Research, Vol. 42, August 2001, pp. 1257-65/ \*Fish oils and the immune system\* OXFORD, UNITED KINGDOM. Animal studies have shown that an increase in fat intake can decrease the number of natural killer (NK) cells found in the blood and spleen. NK cells are an integral part of the natural immune response to virus infections and certain types of cancer. Researchers at Oxford University now report that fish oil significantly decreases NK cell activity in healthy human subjects. Their clinical trial involved 48 men and women aged 55 to 75 years. The participants were randomized to receive one of six supplements for 12 weeks. The supplements were all provided in the form of capsules, three of which were to be taken with each meal. The nine capsules (daily intake) contained either a total of 2 g alpha-linolenic acid, 770 mg gamma-linolenic acid (from evening primrose oil), 680 mg arachidonic acid, 720 mg docosahexaenoic acid (DHA), 720 mg eicosapentaenoic acid (EPA)+ 280 mg DHA (fish oil) or a placebo (an 80:20 mix of palm and sunflower oils). All the participants had blood samples taken four weeks before start of supplementation, immediately before start of supplementation, and then every four weeks during the trial as well as after a four-week washout period. The researchers found no changes in killer cell activity except in the group taking fish oil. Here they observed an average decline of 20 per cent after 8 weeks and 48 per cent after 12 weeks. The decline was completely reversed after the washout period. The fact that no decline was observed with pure DHA strongly suggests that EPA was responsible. The researchers conclude that an excessive EPA intake could have adverse effects for people at risk of viral infections and some cancers. \*Editor's Note\*: The British researchers speculation about fish oils perhaps affecting the effectiveness of NK cells in killing cancer cells is at odds with the results of many other studies. There are at least a dozen studies that show a clear protective effect of fish or fish oil against breast, colon, and prostate cancer. NOTE: This study was partly funded by Unilever. [54 references] / Thies, Frank, et al. Dietary supplementation with eicosapentaenoic acid, but not with other long-chain n-3 or n-6 polyunsaturated fatty acids, decreases natural killer cell activity in healthy subjects aged >55 years. American Journal of Clinical Nutrition, Vol. 73, March 2001, pp. 539-48/ \*Alpha-linolenic acid and DHA\* GRONINGEN, THE NETHERLANDS. Alpha-linolenic acid (ALA) and docosahexaenoic acid (DHA) have both been shown to reduce the risk of heart disease. Studies using isotopically labeled ALA have shown that it can be converted by the body to EPA (eicosapentaenoic acid) and DHA, but how significant this conversion is in actual practice is not known. Dutch researchers now report that the conversion of ALA to DHA in vegans (strict vegetarians) is negligible and that supplementation with ALA does not increase DHA levels significantly. Their trial included 6 healthy men and 3 healthy women between the ages of 20 and 60 years who were adhering to a vegan diet (no meat, fish, eggs or dairy products). The participants were randomized to receive either 2.01 grams of ALA (4 ml linseed [flax] oil) daily or 1.17 grams of gamma-linolenic acid (6 ml borage oil) daily for a four-week period. This was followed by a four-week period during which all the participants received both supplements. Blood samples were taken and analyzed for fatty acid content at the start of the trial and after four and eight weeks. Neither the linseed oil nor the borage oil by themselves increased blood levels of EPA or DHA, but their combination did produce a statistically significant, but nevertheless negligible, increase in EPA and DHA in the cholesterol and triglyceride fractions of the blood. The researchers point out that a clinical trial involving omnivores (meat and fish eaters) gave similar results and conclude that ALA supplementation is not effective in increasing DHA levels significantly. / Fokkema, M.R., et al. Short-term supplementation of low-dose gamma-linolenic

acid (GLA), alpha- linolenic acid (ALA), or GLA plus ALA does not augment LCP omega-3 status of Dutch vegans to an appreciable extent. Prostaglandins, Leukotrienes and Essential Fatty Acids, Vol. 63, November 2000, pp. 287-92/ \*Polyunsaturated fatty acids are safe\* OSLO, NORWAY. Polyunsaturated fatty acids (PUFAs) of the n-6 and n-3 configurations cannot be synthesized by humans and must be obtained from the diet. The most common PUFAs are linoleic acid, linolenic acid, and eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) found in fish oils. Linoleic acid is an n-6 configuration while linolenic acid, EPA and DHA are of the n-3 configuration. Because of the unsaturated nature (multiple double bonds) of PUFAs they are prone to oxidation which makes them rancid and potential initiators of chain reactions which can lead to oxidation of fat and cholesterol molecules in the body. This so-called lipid peroxidation reaction is believed to be implicated in atherosclerosis, cancer and inflammation. Dr. Jan Eritsland, a cardiologist at the Ulleval University Hospital, has just released a major study dealing with the safety of n-3 and n-6 PUFAs. Based on numerous reports published in the medical literature Dr. Eritsland concludes that a high intake of n-3 PUFAs reduces the risk for cardiovascular disease and heart attack and is entirely safe at least up to a level corresponding to 10% of the daily calorie intake. He does caution though that the intake of dietary antioxidants (especially vitamin E) needs to be increased if the PUFA intake is increased. Supplementation with 4 grams/day of highly concentrated fish oil (containing 3.4 g of EPA and DHA) was found to lower triglyceride levels, but had no effect on cholesterol levels or glycemic control (plasma glucose and insulin levels). Although fish oils are known to reduce the tendency of blood to aggregate (clot) a recent major trial showed no difference in bleeding episodes among heart disease patients supplementing with 2 to 5 grams/day of fish oils and the controls. This held true even if the patients were also taking warfarin or aspirin. PUFAs of the n-3 family may help prevent cancer and there is no evidence at all that they promote it. There is, however, some limited evidence that n-6 PUFAs (linoleic acid) may indeed be involved in the initiation or promotion of cancer. Most experts recommend that the intake of linoleic acid not exceed 10% of daily calorie intake. [73 references] / Eritsland, Jan. Safety considerations of polyunsaturated fatty acids. American Journal of Clinical Nutrition, Vol. 71 (suppl), January 2000, pp. 197S-201S/ \*Fish oils are vital to your health\* PORTLAND, OREGON. Research carried out over the past 20 years has clearly shown that omega-3 fatty acids such as DHA (docosahexaenoic acid) and EPA (eicosapentaenoic acid) are essential elements in human nutrition. The primary source of DHA and EPA is fatty fish and oils from the tissues of such fish. DHA is a vital component of the phospholipids in cell membranes throughout the body, but is particularly abundant in the brain, retina, and sperm. Fish oils either from whole fish or in the form of supplements have been found to aid in preventing or ameliorating coronary heart disease, stroke, lupus, nephropathy (kidney disorders), Crohn's disease, breast cancer, prostate cancer, colon cancer, hypertension, and rheumatoid arthritis. Fish oils have been found particularly effective in preventing arrhythmias and sudden death from cardiac arrest. Several studies have shown that people who eat fish once or more each week can reduce their risk of sudden cardiac death by 50-70 per cent. EPA has been found to inhibit blood clotting and EPA and DHA contained in fish oils inhibit the development of atherosclerosis. Fish oil supplementation also significantly lowers overall triglyceride and cholesterol levels without affecting the level of HDL ("good" cholesterol). Recent research has shown that the consumption of high fat meals can initiate the development of atherosclerotic deposits. This effect can be substantially reduced by taking fish oil prior to eating such meals. Omega-3 fatty acids are essential to fetal development and a deficiency of DHA during gestation can lead to visual impairment and perhaps, lower intelligence quotients. In summary, omega-3 fatty acids and in particular, DHA and EPA from fish oils, are essential for human development and in the prevention and amelioration of many common disorders. [38 references] / Connor, William E. Importance of n-3 fatty acids in health and disease. American Journal of Clinical Nutrition, Vol. 71 (suppl), January 2000, pp. 171S-75S/ \*Benefits of essential fatty acids\* HONOLULU, HAWAII. Dr. Joseph Pepping, a consulting pharmacist at the Kaiser Permanente, provides a comprehensive review of the many benefits of omega-3 fatty acids and their derivatives. He cites evidence that eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) which are found in fish oils are helpful in the prevention and treatment of cardiovascular disease, arrhythmias, diabetes, breast cancer, and arthritis. While EPA is readily synthesized in the body from alpha-linolenic acid (found in flaxseed oil) Dr. Pepping states that the synthesis of

DHA is much more difficult and that DHA must be obtained directly from fish, certain algae or green, leafy vegetables. He also points out that the body's optimal balance between omega-6 (linoleic) and omega-3 (linolenic) fatty acids is a 2:1 to 4:1 ratio. Unfortunately, the typical Western diet contains these acids in ratios of 20:1 to 25:1. An excess of omega-6 fatty acids can lead to formation of blood clots, allergic and inflammatory disorders, and the accelerated growth of certain cancer cells. Dr. Pepping recommends two servings of cold-water fish (e.g. salmon, mackerel or herring) per week, 2-4 grams of fish oil capsules per day or 15-30 ml of flaxseed oil per day as a preventive measure. He points out that it is important to add 200 IU of vitamin E to the daily diet if supplementing with fish oils. He also advises caution regarding fish oil supplementation in patients taking warfarin, heparin, low-molecular weight heparin, ticlopidine or clopidogrel. / Pepping, Joseph. Omega-3 essential fatty acids. American Journal of Health-System Pharmacy, Vol. 56, April 15, 1999, pp. 719-24/ \*Your brain needs DHA\* NEW YORK, NY. Dr. Barbara Levine, Professor of Nutrition in Medicine at Cornell University, sounds the alarm concerning a totally inadequate intake of DHA (docosahexaenoic acid) by most Americans. DHA is the building block of human brain tissue and is particularly abundant in the grey matter of the brain and the retina. Low levels of DHA have recently been associated with depression, memory loss, dementia, and visual problems. DHA is particularly important for fetuses and infants; the DHA content of the infant's brain triples during the first three months of life. Optimal levels of DHA are therefore crucial for pregnant and lactating mothers. Unfortunately, the average DHA content of breast milk in the United States is the lowest in the world, most likely because Americans eat comparatively little fish. Making matters worse is the fact that the United States is the only country in the world where infant formulas are not fortified with DHA. This despite a 1995 recommendation by the World Health Organization that all baby formulas should provide 40 mg of DHA per kilogram of infant body weight. Dr. Levine believes that postpartum depression, attention deficit hyperactivity disorder (ADHD), and low IQs are all linked to the dismally low DHA intake common in the United States. Dr. Levine also points out that low DHA levels have been linked to low brain serotonin levels which again are connected to an increased tendency to depression, suicide, and violence. DHA is abundant in marine phytoplankton and cold-water fish and nutritionists now recommend that people consume two to three servings of fish every week to maintain DHA levels. If this is not possible, Dr. Levine suggests supplementing with 100 mg/day of DHA. / Levine, Barbara S. Most frequently asked questions about DHA. Nutrition Today, Vol. 32, November/December 1997, pp. 248-49/ \*Health benefits of fish oils\* SANTIAGO, CHILE. Fish oils are excellent sources of EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid). EPA and DHA in turn are important components of cell membranes and as such play a vital role in overall health. Studies have shown that Greenland Eskimos, who have a very high intake of fish oils, have a very low incidence of heart attacks, asthma, diabetes, psoriasis, and allergies. A Dutch study found that middle-aged men who ate as little as 30 grams of fish per day (average) reduced heart disease mortality by 50 per cent. A study at the Harvard Medical School concluded that men who eat fish have a 26 per cent lower risk of death from coronary artery disease than men who do not eat fish. Other studies have shown that an adequate DHA supply is essential for normal eye and brain development in infants and children. Fish oils are found in high concentrations in herrings, sardines and anchovies, in medium concentrations in salmon, and in somewhat lower concentrations in sole, halibut, cod and shellfish. Fish oils have demonstrable benefits in the prevention and treatment of cardiovascular disease; they reduce blood pressure and triglycerides, modify platelet aggregation, and minimize inflammatory responses. There is anecdotal evidence that fish oils may be beneficial in the treatment of migraine headaches, asthma, and psoriasis. Cell membranes rich in polyunsaturated fatty acids such as EPA and DHA are, however, more susceptible to peroxidation by free radical reactions. This may severely affect their structure and function unless precautions are taken to ensure that the free radicals are neutralized by lipid-soluble antioxidants. Research has shown that people taking fish oil supplements also need to increase their intake of vitamin E. / Uauy-Dagach, Ricardo and Valenzuela, Alfonso. Marine oils: the health benefits of n-3 fatty acids. Nutrition Reviews, Vol. 54, November 1996, pp. S102-S108/ \*Role of fish oils in health and disease\* WASHINGTON, DC. Dr. Artemis Simopoulos of the Center for Genetics, Nutrition and Health has just released a major, ground-breaking study concerning fish oils and their role in human health. Dr. Simopoulos' 25-page report contains 211 references and is truly a gold mine of information about omega- 3

fatty acids and in particular the polyunsaturated fatty acids, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), found in fish oils. Dr. Simopoulos points out that omega-3 polyunsaturated fatty acids (PUFAs) are essential for human health, but that their intake has gradually declined over the years. It is believed that man evolved on a diet with a ratio of omega-6 to omega-3 PUFAs of about 1:1. Today this ratio is more like 10:1 and in some societies is approaching 25:1. A relative over-abundance of omega-6 PUFAs has been implicated in excessive blood clotting, allergic and inflammatory disorders, and certain cancers. An adequate intake of omega-3 PUFAs, on the other hand, has been linked to improved cardiovascular health. A recent study concluded that a daily intake of 500 to 1000 mg of long chain omega-3 PUFAs reduces the risk of cardiovascular death in middle-aged American men by about 40%. Other studies have shown that although fish oils help prevent undesirable blood clotting reactions they do not increase bleeding time and are quite safe even for people scheduled for major surgery. Animal studies have found that fish oil supplementation markedly reduces the risk of fatal arrhythmias. Fish oils have also been found beneficial in preventing or treating hypertension, arthritis, psoriasis, ulcerative colitis, cancer, and certain diabetes-related complications. EPA and DHA are both essential for pregnant mothers and infants and a deficiency can retard the development of the brain and retina. It is estimated that the optimal daily intake of EPA and DHA (total) is about 300 to 400 mg/day. The current average intake in the United States is only 50 mg EPA and 80 mg DHA per person per day indicating a massive deficiency in the American diet. Dr. Simopoulos points out that the Canadian Ministry of Health's guidelines for fatty acid intake recommends a daily intake of 1000 to 1800 mg of omega-3 PUFAs. She cautions that fish oil supplements should always be stabilized with adequate amounts of vitamin E in order to prevent oxidation leading to rancidity. [211 references] / Simopoulos, Artemis. Omega-3 fatty acids in health and disease and in growth and development. American Journal of Clinical Nutrition, Vol. 54, 1991, pp. 438-63/ Coromega \*Additional References\* 1. Horrocks, L.A. and Yeo, Y.K. Health benefits of docosahexaenoic acid. \*Pharmacological Research\*, Vol. 40, September 1999, pp. 211-25 \*Conclusion:\* A review of the many health benefits of DHA. 2. Simopoulos, A.P. Summary of the NATO advanced research workshop on dietary omega-3 and omega-6 fatty acids: biological effects and nutritional essentiality. \*Journal of Nutrition\*, Vol. 119, April 1989, pp. 521-28 \*Conclusion:\* A review of the many health benefits of DHA. \*OILOFPISCES.COM\* \*INTERNATIONAL HEALTH NEWS\* Copyright © 2006 by Hans R. Larsen Oilofpisces.com does not provide medical advice. Do not attempt self-diagnosis or self-medication based on our reports. Please consult your health-care provider if you wish to follow up on the information presented.