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FISH OIL 3/9/09
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Long Bottom Line At The top: Fish oil contains the fatty acids EPA and DHA which do good things. One or two fish servings weekly or 1 gram fish oil daily inhibit clotting and reduce risk of heart attack and sudden death from arrhythmia. Higher doses lower lipid levels, temper inflammation, and alleviated depression in some adults. DHA is essential for normal infant brain and eye development. Read and take seriously the side effects described at the end of this article.

Fish oil contains eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), two long-chain omega-3 fatty acids. They constitute a large proportion of the fat in fish, seafood and the oils pressed from them. They are elongated versions of an essential fatty acid, α -linolenic acid (ALA) present in flax seed

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Natural Shapes, Dove's Campaign for Real Beauty & Eating Disorders Awareness

www.healthychoicesformindandbody.org 3/9/09

The National Eating Disorder Information Centre (NEDIC) observed Eating Disorders Awareness Week the first week of February by "Celebrating Our Natural Sizes". Their motto is "It's not our bodies that need changing. It's our attitudes." Natural shapes and changing attitudes to take care of our bodies and accept the resulting shape sounds a lot like the notions that served as the basis for Healthy Choices for Mind & Body's predecessor group, We Insist on Natural Shapes. Access more information about NEDIC at www.nedic.ca.

The whole concept of appreciating natural rather than make-up/photographic/computerized contrived beauty is promoted year-long by the Dove Company. Their Self-Esteem Fund is a national resource linked to the Campaign for Real Beauty, a program aimed at changing

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Natural Shapes

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the current, narrow definition of beauty. Dove believes that to make a real difference, we must take action and contribute in ways that will help women and girls celebrate their individual beauty. Learn more at www.campaignforrealbeauty.ca.

Dove has won a Cannes Advertising Award for **'Evolution' their film of a model's evolution from her real face** to the one on a billboard ad for foundation make-up. She starts out as a pretty, freckled blond and ends up a doe-eyed, gorgeous brunette with flawless skin. Their tag-line? "No wonder our perception of beauty is distorted." View the film from the website by clicking 'inside the campaign', then 'evolution film'.

The National Eating Disorders Association and 'beat', an organization in the United Kingdom dedicated to 'beating eating disorders' both focused on eradicating eating disorder for their Eating Disorders Awareness Week activities. www.nationaleatingdisorders.org and www.b-eat.co.uk/home. ¶

THERE'S METABOLISM, THEN THERE'S DRUG METABOLISM

by Ann Gerhardt, MD

3/7/09

www.healthychoicesformindandbody.org

When I give talks in high schools, students invariably ask about metabolism. "Why do some kids have high metabolism and eat whatever they want, and others (with low metabolism) have to watch every calorie?"

When I talk to patients about how their body metabolizes medications, nutrients and toxins, their countenance invariably turns to quizzical. They assume that the word 'metabolize' refers to calorie burning, not disposition of the body's by-products or good and bad things that enter our bodies.

Metabolism refers to both processes and more. The prefix 'meta' denotes a change, transformation or occurrence in a series of reactions. 'Metabolism' is the sum of the physical and chemical processes in an organism (banana slugs have metabolism, too). It generates heat and energy for movement and allows us

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Metabolism

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to build new tissue and replace worn out and dying cells. It is responsible for the disposition of all substances in the body, including drugs, bio-active herbs, toxins and by-products of bodily processes.

An 'anabolic' metabolic process builds up whole tissue from small components. Some examples: repairing lacerated skin, growth in childhood, the continual replacement of organ tissue as cells naturally die, making fat globules from sugar, building muscle from protein after a work-out, or growing a beer belly from alcohol.

A 'catabolic' process breaks down a large molecule or tissue into its small component parts. It contributes to the continual turnover of all our tissues. We require catabolic processes to burn food for energy and to maintain our 98.6 degree temperature. We catabolize fat, muscle, organ tissue and stored sugar (glycogen) when food is scarce, or when losing weight.

The control mechanisms for energy metabolism are different from the processes that dispose of medications. A lean person with a 'high energy metabolism' may have slow drug metabolism, and vice versa.

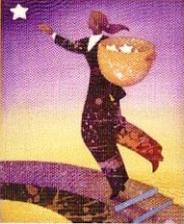
A host of hormones, like thyroid, cortisol, insulin, growth hormone, and sex hormones, regulate our energy metabolism. Our genetic make-up, inherited from our parents, defines the hormone patterns that affect how much we need to eat, as well as our body shape, frame size and cold and heat tolerance.

Various proteins make up the metabolic machinery that activates or disposes of vitamins, minerals (both toxic and essential ones), bioactive substances like medications and herbs, and toxins. Typically this metabolism occurs in the liver, with either complete destruction to basic elements, or disposal of partially degraded substances through the bowel or kidneys.

The liver houses the cytochrome P450 complex, one of the major systems for disposing of drugs and toxins. At least seven different P450 types degrade everything from cholesterol-lowering drugs and heart medications to antibiotics, anti-inflammatories and psychiatric medications.

Medications and naturally occurring substances turn P450 enzymes on and off, thereby influencing how rapidly drugs are metabolized. Erythromycin, nicotine and anti-seizure medications boost these enzymes to inactivate other medications (and themselves) much more rapidly. Other entities put a brake on P450 enzymes, slowing their

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*Walk out like somebody suddenly born into color. Do it now.
Rumi*

Women's Health Data Book

The U.S. Department of Health and Human Services, Health Resources and Services Administration released *Women's Health USA 2008*, the seventh edition of the *Women's Health USA* data book. "To reflect the ever-changing, increasingly diverse population and its characteristics, *Women's Health USA* selectively highlights emerging issues and trends in women's health. Data and information on occupational injury, maternal mortality, digestive disorders, oral health, eye health, and urologic disorders are only a few of the new topics included in this edition. Every effort has been made to highlight racial and ethnic, sex/gender, and socioeconomic disparities where possible."

You can access the book at any of the three web links:

1. <http://mchb.hrsa.gov/>

The first bullet under "Reports"

2. <http://mchb.hrsa.gov/programs/dataepi>

The first bullet under "Reports"

3. <http://www.hrsa.gov/womenshealth/>

The first bullet under "Women's Health Data Books"

Printed copies are also available free of charge from the HRSA Information Center at 1-888-ASK-HRSA.

The 2008 edition does not cover topics from the 2007 edition that have not appreciably changed since then. *Women's Health USA 2008* is not copyrighted. Readers are free to duplicate and use any of the information contained in this publication. Please provide any feedback on this publication to the [HRSA Information Center](http://www.hrsa.gov/womenshealth/) which offers single copies of the data book in print or on CD at no charge.¶

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Mandated Asthma Inhalers Reduce Global Warming

www.healthychoicesformindandbody.org 3/7/09

Bottom Line at the Top: The old asthma inhaler propellants contribute to global warming. The new HFA inhalers feel less forceful, but actually deliver more medication into the lungs. Asthmatics who use albuterol more than once a week should take preventive medication.

At times asthmatics depend on inhaled albuterol, a medication that opens spastic airways, to breathe. For years the inhalers that delivered albuterol to the airways relied on chlorofluorocarbons (CFCs) as the propellant. **CFC's destroy ozone, contributing to global warming.**

As of January 1, 2009, all propellant-based inhalers prescribed and sold in the United States must use hydrofluoroalkane (HFA) propellants rather than CFCs. HFA-based inhalers have been marketed for more than a decade, but until recently many patients continued to use the older CFC-based versions, because they were available as less expensive generics.

Other inhaled and nasal medications have also switched to alternate delivery mechanisms. Some use HFA propulsion, while others use micronized particle sprays. This is why allergy and asthma sufferers have heard "They don't make this anymore" from pharmacists.

Patients, expecting the cold, forceful feel of CFC inhalers, believe they are receiving less medication and complain that HFA-propelled inhalers don't work as well. In fact, they deliver more – It just doesn't feel that way.

CFC-based inhalers forcefully spray cool medication . . . right onto the back of the throat. Most of a dose never reaches the lungs. **The newer inhalers produce a softer,**

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Preventing (More) Heart Disease

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3/7/09

Bottom Line at the Top: Take responsibility for your health and preventing heart disease by exercising. No pill achieves all the beneficial physiological effects of exercise, so don't delude yourself into thinking you have the option of the doctor doing it for you.

In cardiac patients, unhealthy lifestyle choices lead to death. In people who have not yet had their heart attacks, inaction propels them to it sooner. But all is not lost if you have heart disease or a propensity for it. **Regular, moderately strenuous, leisure-time physical activity halves the 5-year risk of death, stroke, heart attack and heart failure, compared to sedentary slugs.**

Most doctors counsel patients to exercise. But with < 15 minute office visits, maybe 4 times a year, that's like throwing paint against the wall and hoping some will stick. Occasionally a single, ominous dictum like, "If you don't start exercising and change your diet, you are going to die" propels a Pillsbury dough-boy into the gym. Shame may keep him there, or he may actually decide he likes the new image. More often, though, the fear dissipates, along with motivation to move, and the old inertia creeps back.

A recovered heart attack victim should start cardiac rehabilitation as soon as possible. Once doctors confirm that monitored activity poses no risk, anyone who wants to avoid a future cardiac death should keep moving.

Change (not exercise) is hard, requiring motivation and consistent mental effort. **Incorporating exercise into our day requires micro-and macro-revision of our routines until activity is an integral, rather than disruptive part of our lives.**

Hopefully repetition internalizes the belief that physical activity *is*, rather than *should be* a regular part of our day. Unfortunately, our glued-to-the-computer, TV-addicted, auto-crazed society lures people into sedentary oblivion. Even with the best of intentions and New Year's resolutions, most people fail to sustain active lifestyles.

After a few weeks most exercisers feel better, sleep better, are less anxious, display less irritability and work more efficiently. One would think that would be enough to make it a life-long passion.

If you smoke, are a male over 40 years old, are overweight, have high cholesterol or are diabetic, please get checked by your doctor before you undertake an exercise program any more strenuous than walking. ¶

Asthma Inhalers *continued from page 4*

warmer and less forceful spray that flows with a deep inhalation down into the lungs. They have a slightly different taste and feel, but the active ingredient is the same – and **more ends up in the lungs.**

The mandated switch did not also mandate patient and physician education or follow-up health data. So when patients report a malfunctioning HFA inhaler, we don't have data from hospitalizations, medication use and urgent care and ER visits to verify or disprove patients' perceptions.

The silver lining of opportunity: Having to change albuterol prescriptions gives doctors an opportunity to review a patient's inhaler usage. We intend albuterol as a rescue medication to be used occasionally. Patients who use them more frequently are more likely to die, a rather unfortunate consequence that patients fail to consider as they puff away on them during an asthma attack.

Other medications, like inhaled steroids, cromolyn and leukotriene inhibitors, control and prevent asthma better when taken daily. They enable truly occasional albuterol use for rescue. And longer lives.

The HFA inhalers are **higher maintenance.** The pump needs to be primed initially and each time there has been a weeks-long hiatus between uses. The tip requires cleaning more often.

HFA-propelled albuterol inhalers available in the United States include *Proair HFA Inhalation Aerosol* (Teva), *Proventil HFA Inhalation Aerosol* (Schering-Plough), and *Ventolin HFA Inhalation Aerosol* (GlaxoSmithKline). *Xopenex HFA* (Sepracor), is an HFA formulation of levalbuterol.

Out-of-pocket **costs, deductibles, and copays are higher** with HFA inhalers. Manufacturers offer various programs for reducing the costs, such as coupons, rebates, and patient assistance programs.

More information about the inhaler switch can be found on the Web sites of the American Academy of Allergy, Asthma, and Immunology; the American College of Allergy, Asthma, and Immunology; and the Allergy and Asthma Network Mothers of Asthmatics.¶

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Healthcare Fraud and Abuse

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3/7/09

We all want to believe that people are honest and capable of only the most ethical and honest behavior. We entrust doctors with significant control over our well-being and hope that they safeguard that trust with exemplary behavior. We expect patients to seek care for real problems and make good-faith efforts to achieve wellness. But doctors and patients are humans and, like priests, politicians, investment bankers and police, they sometimes violate our trust with fraudulent or unethical behavior.

One way that we can all assure that fraud doesn't occur is to review your insurance company's Explanations of Benefits (EOB), even if you don't have to pay any money. The EOB details charges by a doctor, facility or medical supply company and how they were compensated. If you believe that Medicare, Medicaid (MediCal) or your insurance company was billed for a service you never received, call the provider's office for clarification. (Sometimes your concern is just a matter of coding language.) If you still believe you did not receive the contested service, notify the company.

The insurance company has no way to know what was done to or for you or your family member. Only you can let the company know when a billing is fraudulent. I know of a physician who billed for hospital care for a dead person. The daughter notified Medicare.

Workers compensation and personal injury doctors and lawyers "churn" patients through doctor and therapy visits long after any hope for improvement has died. Anything labeled 'medical' costs five times what it would at Ikea or Crate and Barrel. Medical supply companies charge equipment rental fees for returned supplies. And on and on...

On the flip side, patients game the system too. They may see multiple doctors to get narcotics. Some demand insurance coverage for gym memberships, special bedding or bizarre therapies that they should pay for themselves. Others push for brand name drugs when generics would do. Or expect test after expensive test when they don't like the obvious diagnosis.

My personal favorites are those who expect to be waited on in Hotel (insert name) Hospital throughout testing, treatment and recovery that could be accomplished more safely as an outpatient. Or the families who just can't let go and demand weeks of futile intensive care instead of letting nature gently pursue its course.

In case you are feeling smug, I should add to that list the
continued on page 6

Fraud and Abuse *continued from page 5*

majority who end up as healthcare consumers because they can't adopt a lifestyle that might preclude premature health problems and healthcare resource consumption.

Entitlement has become an American way of life. But deep pockets are not bottomless pits, and expecting a fair, honest, reasonable share would allow more to be available for everyone. Most people want insurance premiums and medical costs to decline by paying only for necessary, delivered service. But costs won't decline if healthcare providers receive payment without benefiting the patient. Or if each patient has a double standard – reasonable care for the other guy and extraordinary service for him/herself.

Ridding the system of bad apple doctors makes the rest look good and restores faith in the medical profession. Patients who strive for health as hard as they expect their doctors to work for them end up healthier. **Without both sides using the healthcare system rationally, how can evolve an efficient, cost-effective medical system, in which there is enough to care for everyone?** Or is that too Pollyanna-ish? ¶

Metabolism *continued from page 3*

work, so that drug levels persist at high levels. Boosting or blocking each others' clearance is how two medications may interact to create an unexpected outcome.

Grapefruit augments some medications, even to toxic levels, by inhibiting degradation by P450-3A4. St. John's Wort does the opposite, stimulating P450-3A4 activity, possibly inactivating so much medication that it doesn't work.

For some final confusion, consider that a starving anorexia nervosa patient often has high cholesterol levels. We presume this to be due to the body going into preservation mode. It doesn't waste energy on relatively unimportant metabolic processes, like clearing cholesterol.

How can you determine your metabolism? We can easily measure basal (resting) energy requirement in a pulmonary lab to get an idea of someone's energy metabolism. It takes really sophisticated techniques to estimate total (resting and activity) energy expenditure.

We really don't yet have tests for P450 activity. After taking a few medications and experiencing side-effects at very low doses, one can only guess that the clearance mechanisms are minimal in that individual. (The caveat to this approach is that humans are human, and suggestible ones who read the package insert get side effects, regardless of reality or their metabolism. ¶)

Kick Butts Day

Join Tobacco-Free Kids for the 14th annual Kick Butts Day, March 25, 2009, to help prevent teen smoking.

This national day of activism empowers youth to speak up and take action against Big Tobacco at more than 2,000 events from coast to coast. Students from schools across the country hold events and activities that call attention to the problems caused by Big Tobacco and its attempts to market to youth.

Visit the 2009 Kick Butts Day (KBD) website at www.kickbuttsday.org and request your free KBD activity guide today. You can view the activity guide and print out your own KBD posters and bookmarks. Please direct any questions to KBDinfo@tobaccofreekids.org.

Fish Oil *continued from page 1*

Theoretically we don't need to consume EPA and DHA from fish, because our bodies can make them from ALA. But we aren't very efficient at making long chain omega-3 fatty acids, and the longer the chain, the less we make. In spite of DHA being the major omega-3 fatty acid in the brain, we make less DHA, at a length of 26 carbons, than we do 25-carbon EPA.

The other essential fatty acid, linoleic, is an omega-6 fatty acid. In spite of linoleic and linolenic acids being almost identical, they follow very different paths in the body, leading to or against inflammation, clotting and immune activation.

Non-fish oil omega-3 fatty acids: People unjustifiably lump all the omega-3 fatty acids, from ALA to DHA, together as a class of do-good fats. ALA substitutes only as a weak version of DHA and EPA when it comes to preventing cardiac problems. The data that supports ALA as preventing heart disease suffers from poor study design and confounding by other dietary changes.

DHA's role in brain and nerves far surpass those of EPA or ALA. Limited conversion of EPA and ALA to DHA guarantee that the former won't work as well as the latter.

We believe that EPA and DHA act together to lower triglycerides (fat in the blood) and reduce heart disease and inflammation, but no one has evaluated them **Fish Oil** separately. Other sources of omega-3 fatty acids, such as nuts, reduce cardiovascular disease, but other good things in nuts might be responsible.

Neurological effects: Infants and small children absolutely require tiny amounts of DHA for brain and eye *continued on page 7*

Fish Oil

continued from page 6

growth and development. Without it, their ability to see, think and behave normally suffers. In spite of turning some ALA into DHA, most of the DHA they need comes from the maternal womb and breast milk. Mothers' bodies accommodate by packing breast milk with linolenic acid, EPA and DHA, at almost 5 times the omega-6 fatty acid concentration.

N-3 fatty acids may be involved in brain speech-center development. In a small study in which each child served as their own control, as little as 250 mg per day of EPA + DHA benefitted children with speech apraxia.

Fish oil has helped some adults with neurological and behavioral disorders, ranging from depression and bipolar disorder to schizophrenia and dyslexia. We lack good studies to tell us which patients will benefit most and which dose works best. Depression requires a higher dose (more than 3 grams) than does heart disease.

Japanese students who took 1.5-1.8 grams of DHA daily, scored better on tests of stress and aggression during final exams, compared to those who took soybean oil capsules. Don't get too excited – it didn't make them smarter, just more relaxed.

Cancer Omega-3 fatty acids have suppressed cancer growth in animals. No epidemiological data have yet linked dietary fish with less cancer in humans.

Inflammation The body converts omega-3 fatty acids into predominantly *anti*-inflammatory molecules. Omega-6 fatty acids originating in vegetable oils often generate *pro*-inflammatory substances. EPA competes for the cyclooxygenase enzyme to block omega-6 fatty acids conversion to pro-inflammatory substances

Doctors have toyed with fish oil to treat inflammatory diseases for a long time. What we know so far is: When someone lands in the hospital with severe enough infection that it causes diffuse lung disease, feeding omega-3 fats may reduce inflammatory damage. The same is true in the lab with animals.

Large EPA + DHA doses (2.7 grams daily) halve the relapse rate in Crohn's disease, an inflammatory disease of the colon. Large amounts of EPA + DHA (> 9 grams of standard fish oil capsules) alleviate pain and swelling to some extent in rheumatoid arthritis patients. Whopping doses of 12 grams fish oil daily can help heal a chronic overuse musculoskeletal injury.

Cholesterol & Triglycerides: Since the 1950's we have known that fish oil is superior to other fats in lowering cholesterol. The first study to reduce heart attacks with fish diets was published in 1972. However, in the 1970's

and 1980's, as Americans increasingly focused on cholesterol, public health officials and dietitians demonized saturated fat and told us to eat vegetable oils rich in omega-6 fatty acids. The fact that EPA + DHA is 6 to 7 times more potent than omega-6 fatty acids was lost on the American dietary scene.

Dietary fish oil is especially good at lowering triglyceride levels. It also dials down the liver's production of apoB, the major LDL protein. Fish oil is one of the few things that lowers Lp(a), a particularly bad form of LDL. Fish oil decreases lipids in people with a wide range of starting cholesterol and triglyceride levels. The higher the triglycerides, the better it works, even in the face of high dietary cholesterol intake.

In the process of lowering triglycerides EPA + DHA may raise LDL-C levels. As the body disposes of the triglyceride-carrying VLDL particles, they evolve into LDL particles. If the liver can effectively clear LDL from the blood, LDL-C blood levels fall along with triglycerides. If not, they rise.

Blood Pressure: Large EPA+DHA doses (6 grams of 85% EPA + DHA) lower systolic pressure (top number) by 4.6 and the diastolic pressure (bottom number) by 3. For reference, EPA + DHA constitutes only 40-50% of natural fish oil.

Eskimos: Ground-breaking studies of Greenland Eskimos attributed the scarcity of heart attacks to their diet. Studies in the 1950's through the 1970's found that they consumed enough seal, whale and fish to provide 14 g/day of omega-3 fatty acids, a huge load, and had lower than predicted cholesterol and triglyceride levels. If Eskimos move to another country and forsake their seal and whale diet, their heart attack rate approximates the rate in the new country, confirming that genetics don't play a role.

Heart Disease & Death: Fish oil doesn't necessarily protect against death: Eskimos have low heart attack rates, but have short life expectancy. People in both Japan and eastern Finland eat fish frequently but Finns' heart disease rate far exceeds that of Japanese. What if the Eskimos' protective agent, instead of omega-3 fatty acids, is living in an igloo or not having a corporate boss?

To address this question, further observational diet trials were done. They confirm the high fish → low heart attack theory. The Diet and Reinfarction Trial showed a 29% reduction in overall mortality in survivors of a first heart attack who consumed fatty fish at least twice weekly for two years. Japanese-American men who ate 2 or more fish meals per week in the Honolulu Heart study had 1/3 the risk of heart attacks as those who ate less than that.

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Fish Oil

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The Chicago Western Electric Study of middle age men followed for up to 31 years showed an inverse association between fish consumption and death from coronary heart disease. Investigators found similar results in middle-aged men and elderly men and women in a Netherlands trial and part of the Multiple Risk Factor Intervention Trial.

The Health Professionals Follow-up Study confirmed that people who ate 1-2 fish servings weekly incurred 25% less coronary risk than those who ate none at all. But they debunked the more-fish-is-better idea, finding no further benefit from high levels of fish intake, especially in those most worried about a heart attack. If a person thinks he will surely die of heart disease, he may clean up his entire lifestyle, not just fish, destroying any conclusions one might make about fish alone.

Some observational studies are not so positive. After 11 follow-up years, the Physicians' Health Study (all males) concluded that eating fish at least once a week did not affect heart attack rate or cardiac mortality. It did cut the sudden and all-cause death rate.

Analyses of lumped together studies generally find 10-24% fewer fatal and 22-29% fewer non-fatal heart attacks, 12-46% fewer strokes and 23% improved total mortality. Both patients who have never had heart disease and those with prior heart attacks accrue benefit from 1-2 fish meals per week. These number seem relatively consistent, but do vary, probably because we can't control all variables.

The best way to prove that fish oil rather than fish (which may work by displacing something worse) keeps people free from heart disease, is to test it directly against placebo. In one such study 6 grams (a high dose) of EPA-enriched fish oil daily for two years partially reversed coronary patients' arterial narrowing. In another, 4 grams of fish oil per day reduced the risk of clogging a coronary artery graft by 25%. A few scientists have measured body tissue concentrations of omega-3 fatty acids after supplementation, and found that levels correlate with reduced heart attack rates.

The GISSI-Prevenzione trial of 11,324 subjects drives the argument for supplementation. With 1 gram per day of EPA+DHA (not fish oil), fewer people died in the two years after a heart attack, compared to those ingesting no fish or fish oil. The sudden death rate plummeted, presumably from a reduction of abnormal heart rhythms. Compared to people taking no supplement, the benefit was immediate and progressively widened to statistical significance within 4 months. Fish oil did this without lowering LDL-cholesterol - In fact, it increased slightly.

Timing: Some scientists think that fish oil or EPA + DHA supplements prevent the most deaths if started within days after a heart attack. Ongoing studies are now looking at optimal timing.

Statins: Fish oil should supplement statins in high risk patients, not replace them. Statins lower LDL-C much more effectively and have non-cholesterol effects that reduce vascular disease.

Stroke: Nine studies of fish oil and stroke incidence varied widely, from 6% *more* to 21% *fewer* strokes in people consuming any fish compared to those who eat none. Unlike heart disease, as the number of fish meals per week increases, they seem to proportionately increase protection, reducing stroke by 12-46%.

People who eat fish are usually in a higher socio-economic class, exercise more, and smoke and weigh less, so can't give all the credit for reducing strokes to fish. This must be the case, since more Greenland Eskimos succumb to strokes than do fish-eating Japanese. So eat fish, optimize overall lifestyle and go light on the seal and whale meat.

Arterial disease in legs: The limited data available concerning omega-3 fatty acids and peripheral arterial disease doesn't look promising, in spite of decreased blood viscosity.

Heart Rhythm: Those who consume fish or fish oil capsules have lower risk of sudden cardiac arrest. The most common causes of cardiac arrest are massive heart attack and arrhythmia (irregular, rapid heart rate). Fish oil seems to stabilize heart rhythms, as seen in animal models, cell culture and cardiac bypass patients. Fish oil may not block all arrhythmias: EPA+DHA seem to work their anti-arrhythmic magic best in survivors of heart attacks and by reducing atrial fibrillation and PVC's, rather than ventricular tachycardia or fibrillation.

Dose: People who eat any fish fare better than those who eat none. Most evidence points to no added benefit from taking more than 1 gram EPA+DHA daily or eating more than 1-2 fish servings (3-4 ounces each) per week. As little as 30 g (one ounce) of lean fish per day lowered mortality by 50% in the Zutphen heart/diet study, without further benefit in those who ate much more. I wonder how many fish servings it takes to off-set a string of bacon/baloney/ribs days.

Mechanisms for vascular effects: EPA and DHA probably reduce heart disease and stroke through their effect on platelets. Platelets are bits of cells that form clot when activated by injury. Clot and cholesterol plug

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Fish Oil

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arteries, causing tissue to die from lack of a blood supply. themselves into platelet membranes, inhibiting platelet aggregation and prolonging bleeding time. This probably involves effects on prostaglandins. If platelets can't aggregate, arteries are less likely to close off. The effect is not as strong as that of 81 mg of aspirin.

EPA and DHA also work in many other ways: They reduce clot by reducing levels of some clotting proteins and inducing an activator of clot dissolution. They enhance blood vessel relaxation by nitric oxide. They reduce activity of the special nervous system involved in the 'flight or fight' response. By depositing in cell membranes, EPA and DHA reduce blood thickness and increase blood cell fluidity. Through other mechanisms (SRBP & PPAR's), they block fat generation and stimulate fat burning.

Diabetes: Scientists differ with respect to fish oil's effect on blood glucose. Insulin sensitivity improves in rats fed omega-3 fatty acids, probably by influencing cellular regulation of fat and sugar metabolism. Greenland Eskimos and Alaskan Indians have much less diabetes than would be expected from their obesity. These data seem promising, but we are long way from recommending fish oil for sugar control.

With all the heart disease that afflicts diabetics, one would think they should all take fish oil. I'm not aware of a study that singles out diabetics to see if they have fewer heart attacks or deaths on fish oil.

Sources: Only marine sources supply EPA and DHA in quantities sufficient to influence health. The most concentrated sources, fatty deep sea fish, include mackerel, all types of salmon, sablefish, eel, yellowfin tuna, Maine lobster, Pacific oysters and herring.

Flaxseed oil and English walnuts are rich in ALA. Other oils, like soybean, canola and olive, and plants like chia, hemp, purslane, kiwi seeds and lingonberry contain some ALA, but omega-6 fatty acids predominate. Wild plant leaves contain appreciable omega-3 fatty acids, while cultivated plants are poor sources. Wild animal meat contains small amounts of omega-3 fatty acids because the animals feed on wild plants. Feeding domesticated animals omega-6 fatty acid rich corn yields meat with only saturated and omega-6 fatty acids.

Side effects: The very effects that keep arteries from clotting off can cause problems. Greenland Eskimos have prolonged bleeding times and easy bruising, presumably as a result of fish oil's platelet effects.

Mercury may contaminate fish, particularly farmed fish. Be sure to choose a fish oil supplement from non-farmed fish that has been purified of any PCB's, dioxin and mercury. Besides making someone loony, mercury may predispose to CHD.

Omega-3 fatty acids have a 4% rate of mostly gastrointestinal side effects. People may burp fish, bloat and/or have loose stool. Fish oil might make psoriasis worse, whereas omega-6 fats seem to improve it, for unclear reasons.

Though EPA and DHA become anti-inflammatory prostaglandins and reduce inflammation, their many double bonds might peroxidize prior to such conversion. Adding vitamin E to fish oil capsules keeps them from oxidizing while sitting on the shelf, but may not be sufficient to prevent doses greater than 3 grams daily from increasing blood peroxides. ¶

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Mission: Promote the vision of a world in which all people practice healthy lifestyles by:

- 1) Educating children and adults to understand the components of healthy lifestyles and how to incorporate those components into their own lives;**
- 2) Changing standards of beauty and health to those that do not define us by our weight and do not promote eating disorders, including anorexia, bulimia, binge eating disorder, and compulsive overeating that may lead to obesity; &**
- 3) Interpreting health-related news within the context of existing medical knowledge to enable individuals to apply it to their own lives.**

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