

Omega-3 Fatty Acids and Cardiovascular Disease New Recommendations From the American Heart Association

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Background

¹Since the original American Heart Association (AHA) Science Advisory was published in 1996,¹ important new findings have been reported about the benefits of omega-3 fatty acids on cardiovascular disease (CVD). Omega-3 fatty acids are obtained from two dietary sources: seafood and certain nut and plant oils. Fish and fish oils contain the 20-carbon eicosapentaenoic acid (EPA) and the 22-carbon docosahexaenoic acid (DHA), whereas canola, walnut, soybean, and flaxseed oils contain the 18-carbon α -linolenic acid (ALA). ALA appears to be less potent than EPA and DHA. The evidence supporting the clinical benefits of omega-3 fatty acids derive from population studies and randomized, controlled trials, and new information has emerged regarding the mechanisms of action of these nutrients. These are outlined in a recent Scientific Statement, "Fish Consumption, Fish Oil, Omega-3 Fatty Acids and Cardiovascular Disease."²

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What Do Epidemiologic and Clinical Studies Show?

Large-scale epidemiologic studies suggest that people at risk for coronary heart disease (CHD) benefit from consuming omega-3 fatty acids from plants and marine sources. Although the ideal amount to take is not firmly established, evidence from prospective secondary prevention studies suggests that intakes of EPA+DHA ranging from 0.5 to 1.8 grams per day (either as fatty fish or supplements) significantly reduce the number of deaths from heart disease and all causes. These data support the 2000 AHA Dietary Guidelines recommendation to include at least two servings of fish (particularly fatty fish) per week. For ALA, a total intake of 1.5 to 3 grams per day seems beneficial, although definitive data from prospective, randomized clinical trials are still needed.

In randomized clinical trials (RCTs) that enrolled patients with coronary heart disease, omega-3 fatty acid supplements significantly reduced CV events (death, nonfatal heart attacks, nonfatal strokes). Omega-3 supplements can also slow the progression of atherosclerosis in these patients.

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Mechanisms of Action

The ways that omega-3 fatty acids reduce CVD risk are still being studied. However, research to date suggests that they can

- decrease risk for arrhythmias, which can lead to sudden cardiac death.
- decrease risk for thrombosis, which can lead to heart attack and stroke.
- decrease triglyceride and remnant lipoprotein levels.
- decrease rate of growth of the atherosclerotic plaque.
- improve endothelial function.
- (slightly) lower blood pressure.
- reduce inflammatory responses.

AHA Recommendations

The AHA recommends that all adults eat fish (particularly fatty fish) at least two times a week.³ Fish is a good source of protein and is low in saturated fat. Fish, especially oily species like mackerel, lake trout, herring, sardines, albacore tuna, and salmon, provide significant amounts of the two kinds of omega-3 fatty acids shown to be cardioprotective, EPA and DHA. The AHA also recommends eating plant-derived omega-3 fatty acids. Tofu and other forms of soybeans; walnuts and flaxseeds and their oils; and canola oil all contain ALA.

For patients with documented CHD, the AHA recommends \approx 1 g of EPA and DHA (combined) per day. This may be obtained from the consumption of oily fish or from omega-3 fatty acid capsules, although the decision to use the latter should be made in consultation with a physician. The amount of EPA and DHA in fish and fish oil is presented in the recent AHA Scientific Advisory on omega-3 fatty acids and CVD.²

An EPA+DHA supplement may be useful in patients with hypertriglyceridemia. Two to four grams of EPA+DHA per day can lower triglyceride 20% to 40%. Patients taking more than three grams of these fatty acids from supplements should do so only under a physician's care. Very high ("Eskimo") intakes could cause excessive bleeding in some people.

Cautions

Some types of fish may contain significant levels of methylmercury, polychlorinated biphenyls (PCBs), dioxins, and other environmental contaminants. Levels of these substances are generally highest in older, larger, predatory fish and marine mammals. Two recent epidemiologic studies have reported conflicting findings about whether there is an association between methylmercury exposure and CHD, with one

showing a negative effect on CHD health in adult men,⁴ and the other reporting no association between methylmercury exposure and CHD in a large cohort of male health professionals.⁵ While further studies are needed to resolve this issue, it is important to appreciate that there are many species of fish that are rich sources of omega-3 fatty acids that are low in methylmercury⁶ and that fish oil supplements are methylmercury-free.⁷

The benefits and risks of eating fish vary depending on a person's stage of life. Specific guidance on fish consumption can be found on web sites at the Environmental Protection Agency⁸ and the US Food and Drug Administration.⁹

- Children and pregnant and nursing women usually have very low CVD risk but may be at higher risk of exposure to excessive mercury from fish. Avoiding potentially contaminated fish is a higher priority for these groups.
- For middle-aged and older men and for women after menopause, the benefits of eating fish far outweigh the risks when consumed according to the guidelines of the US Food and Drug Administration and Environmental Protection Agency.
- Eating a variety of fish will help minimize any potentially adverse effects due to environmental pollutants.

Conclusion

Randomized trials have convincingly documented that omega-3 fatty acids can significantly reduce the occurrence of CVD events in patients with coronary artery disease. The strongest evidence to date is from studies in which marine-derived omega-3 fatty acids have been consumed as supplements or fish. Additional clinical studies are needed to

confirm the cardioprotective benefits of ALA. A food-based approach to increasing omega-3 fatty acids is preferable, although supplements are a suitable alternative. Additional clinical and mechanistic studies are needed to confirm and further define the health benefits of omega-3 fatty acids for both primary and secondary prevention.

References

1. Stone NJ. Fish consumption, fish oil, lipids, and coronary heart disease. *Circulation*. 1996;94:2337–2340.
2. Kris-Etherton PM, Harris WS, Appel LJ. AHA Scientific Statement: Fish consumption, fish oil, omega-3 fatty acids and cardiovascular disease. *Circulation*. 2002;106:2747–2757.
3. Krauss RM, Eckel RH, Howard B, Appel LJ, Daniels SR, Deckelbaum RJ, Erdman JW Jr, Kris-Etherton P, Goldberg IJ, Kotchen TA, Lichtenstein AH, Mitch WE, Mullis R, Robinson K, Wylie-Rosett J, St Jeor S, Suttie J, Tribble DL, Bazzarre TL. AHA dietary guidelines: revision 2000: A statement for healthcare professionals from the nutrition committee of the American Heart Association. *Circulation*. 2000;102:2284–2299.
4. Guallar E, Sanz-Gallardo I, van't Veer P, Bode P, Aro A, Gomez-Aracena J, Kark JD, Riemersma RA, Martin-Moreno JM, Kok FJ, Heavy Metals and Myocardial Infarction Study Group. Mercury, fish oils and the risk of myocardial infarction. *N Engl J Med*. 2002;347:1747–1754.
5. Yoshizawa K, Rimm EB, Morris JS, Spate VL, Hsieh CC, Spiegelman D, Stampfer MJ, Willett WC. Mercury and the risk of coronary heart disease in men. *N Engl J Med*. 2002;347:1755–1760.
6. Bolger PM, Schwetz BA. Mercury and health. *N Engl J Med*. 2002;347:1735–1736.
7. Ebel JG Jr, Eckerlin RH, Maylin GA, Gutenmann WH, Lisk DJ. Polychlorinated Biphenyls and p,p'-DDE in Encapsulated Fish Oil Supplements. *Nutr Rept Intl*. 1987;36:413–417.
8. US Environmental Protection Agency. Fish Advisories web page. Available at: <http://www.epa.gov/waterscience/fish/>. Last accessed December 2002.
9. US Food and Drug Administration, Center for Food Safety and Applied Nutrition, Office of Seafood. Mercury levels in seafood species. Available at: <http://www.cfsan.fda.gov/~frf/sea-mehg.html>. Last accessed December 2002.

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