Atherosclerosis Update

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Fish oils and cardiovascular disease

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The low frequency of arterial thrombosis and cardiovascular disease in Greenland Inuit, who consume much marine food, and epidemiologic evidence of an inverse relation between fish consumption and death from coronary heart disease (CHD) have stimulated many clinical trials.[1] Oral supplements of fish oil concentrates providing 2.5 to 6 g daily of omega-3 fatty acids — eicosapentaenoic acid (EPA) plus docosahexaenoic acid (DHA) — have had hypolipidemic, antiatherogenic and antithrombotic effects without lowering total plasma cholesterol or low-density lipoprotein cholesterol levels.

Fish oils enriched in omega-3 fatty acids appear to be readily tolerated and reduce plasma triglyceride and very-low-density lipoprotein levels. Recently they were licensed in Britain and elsewhere in Europe. Omega-3 therapy reduces triglyceride levels by 40% to 50% in patients with type IIb and type IV or V hypertriglyceridemia.[2] Indeed, two fish meals per week significantly lowers triglyceride levels in normal subjects. It also causes a slight to moderate rise in high-density lipoprotein cholesterol levels and is thought to protect against CHD.

Fish oil dramatically inhibits atherogenesis in swine, possibly by suppressing production of growth factors and thereby inhibiting migration and proliferation of arterial smooth muscle cells. In three of five recent randomized trials patients consuming fish oil supplements had reduced rates of restenosis after percutaneous transluminal coronary angioplasty. The five studies combined revealed a restenosis rate of 24% for fish-oil-treated patients and 33% for controls.[3]

Consumption of omega-3 fatty acids can significantly dampen platelets' ability to aggregate and interact with the vessel wall while mildly prolonging bleeding time.[1] Fish oil may reduce thrombogenicity partly because of decreased formation of thromboxane A_2 (TxA_2) in the stimulated platelet. TxA_2 also causes vasoconstriction; hence fish oil's antihypertensive effect.[4] Fish oil concentrates may reduce the high incidence of thromboembolic complications in renal allograft recipients by inhibiting platelet aggregation, lowering plasma triglyceride levels and increasing erythrocytes' ability to be filtered.[5]

Unlike membrane phospholipids of circulating platelets, where EPA accumulates much more than DHA upon fish oil consumption, cardiac tissue becomes greatly enriched in DHA.[6] Interestingly, dietary fish oil prevented ventricular fibrillation after coronary artery occlusion and reperfusion in an animal model.[7]

Dietary intervention with fish oils has few or no side effects and the potential, in certain applications, to provide results as good as those with drugs. In a randomized controlled trial on secondary prevention of myocardial infarction the subjects eating fatty fish at least twice a week had a 29% lower 2-year all-cause mortality rate because of a reduced rate of death from ischemic heart disease.[8]

Further studies on the use of omega-3 fatty acids in disease prevention and management are needed.

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