Mini-Review – EPA/DHA Omega-3 Supplementation for the Complementary Management of Key Risk Factors for Cardiovascular Disease

Introduction

The impact of consuming long-chain omega-3 fatty acids as EPA (eicosapentaenoic acid) plus DHA (docosahexaenoic acid) from fish/fish oils has been extensively studied in clinical trials (1,2) and shown to have beneficial effects on several risk factors for cardiovascular disease (CVD). These risk factors include those that can readily be determined via a regular medical check-up with a personal physician (and/or self home-monitoring for some) as well as others (eg., blood platelet aggregation, vascular resistance, inflammatory factors) which are not routinely measured or readily available in the health care system. The present summary will focus on the former category of risk factors and will include blood lipid/lipoprotein levels, blood pressures, and resting heart rate. Increased intakes of EPA/DHA can serve in the complementary management of these risk factors (ie, added to other therapeutic treatments including pharmacological). Numerous human studies have indicated that EPA/DHA intakes can also exert their beneficial effects when used alone for some applications and in those individuals not yet on targeted pharmaceutical therapeutics thereby offering an opportunity for protective cardio care.

Blood Lipid/Triglyceride Levels

Elevated serum lipid/lipoprotein concentrations have long been identified as major risk factors for CVD including high total cholesterol (C), high LDL-C, and low HDL-C. During the past many years, the circulating level of fasting serum/plasma triglyceride (TG) has become recognized as an independent risk factor for sectors of the population. It is rather unfortunate that Canadian guidelines have often considered elevated TG levels to be a ‘secondary optional target for high-risk’ individuals with targeting of fasting TG level lowering for levels of 1.7 mmol/L or above while not addressing those with lower levels. Population studies have indicated that circulating levels of fasting TG well below 1.7 mmol/L (150 mg/100 ml) in the range of 1.1-1.7 mmol/L (100-150 mg/100 ml) have been associated with an increased risk of myocardial infarction as compared to lower levels (3). Such is of even greater concern in those with metabolic syndrome. The majority of adults in North America exhibit fasting serum (plasma) TG levels well above 1.1 mmol/L. As reviewed (see www.dhaomega3.org), each gram (1000 mg) daily of supplemental EPA plus DHA can be expected to lower the fasting TG level by approx. 7-9% within 4 weeks. Thus, 3-4 grams daily, taken at or near meal time, can lower levels by approx. 25-30%. It is noted that a suppression in postprandial (post-meal) surges in blood TG levels can also be expected. A meta-analysis indicated that each 0.1 mmol/L decrease in fasting TG levels was associated with a 1.4% and 3.7% decrease in CVD risk in males and females, respectively. Many clinicians are suggesting EPA/DHA

Reference:

Bruce Holub, Ph. D., Scientific Director, DHA/EPA Omega-3 Institute, University of Guelph Research Park, Guelph, Ontario, Canada (Email: bholub@uoguelph.ca)
supplementation as a therapeutic option to fibrate for TG-lowering. Numerous clinical trials have shown combination therapy with statins (for cholesterol-lowering) plus EPA/DHA supplementation (4) to be efficacious and safe for combined dyslipidemia (elevated cholesterol and TG levels).

Blood Triglyceride : HDL(Cholesterol) Ratio
While not regularly utilized in blood lipid testing/reporting, a higher TG: HDL(C) ratio has been associated with an increased risk for a myocardial infarction as well as an index of heart disease mortality and incidence of type 2 diabetes mellitus (3, 5). Women with higher ratios were also more likely to have carotid plaques (6). A published clinical trial from our group in postmenopausal women found a marked lowering (by 28%) of this ratio within one month with daily supplementation at 4 grams/day of EPA/DHA (7). It is noted that up to 5 grams (5000 mg) daily is considered to be generally safe for most people by the European Food Safety Authority (EFSA) and Health Canada.

Blood Pressure
Based on several published trials, systematic reviews have indicated that fish oil supplementation with EPA/DHA can play a role in the prevention and treatment of hypertension while not a substitute for prescribed pharmacological therapy. As reviewed (8), a median intake of 3.7 grams/day of EPA/DHA over a few weeks or more reduced blood pressure by 2.1 mmHg (systolic blood pressure) and 1.6 mmHg (diastolic blood pressure) with the greatest reduction in older subjects (lowering by 3.5 and 2.4 mmHg, respectively) and in hypertensive (equal to or greater than 140/90 mmHg) individuals (lowering by 4.0 and 2.5 mmHg, respectively). Population studies (eg., MRFIT) have associated each 1 mmHg rise in systolic blood pressure (over the range of 120-159 mmHg) with a 3.6% increase in the risk of coronary heart disease (CHD) (9). The aforementioned reductions in systolic blood pressure with EPA/DHA can be expected to provide a reduced risk of CHD by 12.6% (older subjects) and 14.4% (in hypertensives). Very recently, a modest intake of supplemental EPA/DHA (only 700 mg/day) over a 6 week period in men plus women (average age of 45 years) with an average initial systolic blood pressure of 146 mmHg resulted in a statistically-significant reduction in blood pressure of 5 mmHg (10). Based on the aforementioned systolic blood pressure-outcome relationship, an estimated 18% reduction in the risk of CHD can be predicted.

Resting Heart Rate
General population studies (11) have shown that increases in the resting heart rate also represent an independent risk factor for several cardiovascular events (incl. myocardial infarction and cardiovascular mortality). An average resting heart rate of 85 bpm (beats per minute) has been associated with a 47% greater risk for a myocardial infarction relative to 65 bpm. Relatively modest daily supplementation with EPA/DHA (810 mg/day) over a 4 month period significantly reduced the resting bpm by 7% overall (12). Such might then be expected to reduce the risk of myocardial infarction by 14% for individuals with resting heart rates of 85 bpm based on the above relationship.

Conclusion
There is considerable evidence-based information that increased intakes of EPA/DHA to levels which are well above current dietary intakes in North America (approx. 120-150
mg/person/day) can play a role in attenuating common risk factors for CVD when used either as complementary treatment or independently as part of an overall preventive strategy. Several servings of appropriately-selected fish per week or moderate supplementation can provide EPA/DHA intakes approaching 700-1000 mg/day. Higher intakes will require the use of supplemental EPA/DHA in the vast majority of individuals to reach the targets used in the aforementioned clinical trials wherein beneficial impacts on risk factors for CVD have been reported. Further information from evidence-based studies on the potential benefits of EPA/DHA in these and other conditions can be found at www.dhaomega3.org.

References