



Issue 24: May, 2017: This e-bulletin is aimed at personnel in fisheries and aquaculture, at fish packers, processors, distributors, retailers and finally, consumers.

Omega-3 index:-a future powerful indicator of heart disease risk?

Dr William Harris (University of South Dakota, USA) and other researchers have promoted the omega-3 index as an indicator of coronary heart disease risk on the basis of strong epidemiological evidence (1-4). The index is defined as the content of eicosapentaenoic (EPA) + docosahexaenoic (DHA) fatty acids in red blood cells (erythrocytes) divided by the total fatty acid content in the erythrocytes expressed as a percentage. Oily fish, krill and some algae are the best natural sources of EPA and DHA, and the positive role of these compounds in cardiovascular health and brain development and function has been highlighted in previous issues of SeaHealth-ucd (1, 2, 7 and 8). This is good news for the fishing sector and the benefits of regular oily fish consumption must continue to be promoted by Bord Bia and Bord Iascaigh Mhara. Supermarkets often promote fish on the basis of protein and vitamin content but less often on the basis of healthy fish oils. Most (98%) of 300 consumers interviewed in a recent survey (SeaHealth-ucd, Issue 8) had heard of omega-3 fish oils and 65% knew they are good for health and cited heart and brain health as the main reasons. However, 35% of the 300 consumers did not know why fish oils are good for health thereby confirming the need for further promotion.

Technical aspects of omega-3 index

Red blood cell omega-3 levels are biologically stable and don't vary much in an individual over time. This may give the omega-3 index an advantage over current cardiovascular health indicators HDL (so-called good cholesterol) and LDL (so-called bad cholesterol) which are probably more variable within an individual over time. Red blood cell omega-3s are well-studied with more than 100 collaborative research projects, both concluded and ongoing, and at least 75 publications to date. Thus the omega-3 index has emerged as a possible indicator of the risk of fatal and non-fatal cardiovascular events and fulfils important criteria for novel biomarkers as accepted by the American Heart Association. As a result the Omega-3 Index is sometimes cited as a better predictor of sudden cardiac death than the currently used blood cholesterol (total, LDL, HDL) and blood triglycerides.

Raising your omega-3 index

Research has indicated that an omega-3 index of 4 or below is 'bad' and 8 or above is 'good' (1) and this has been confirmed in a recent major study (2). If the cardiovascular heart disease (CHD) risk associated with an index <4% is assigned a risk ratio of 1 then corresponding risk ratios for persons in the 4-8% and >8% index categories are 0.62 and 0.2 respectively i.e. a 5-fold reduction in CHD risk (1). The omega-3 index is only partly explained by EPA/DHA intake as individuals have different abilities to absorb ingested EPA/DHA in their red blood cells (i.e. a bioavailability issue). This has made the design of large scale clinical trials difficult and complex (3). The cost of such trials is also very high. Eating oily fish (mackerel, herrings, salmon, sardines, tuna, sea bass, etc.) is the recommended route to obtain EPA/DHA and thereby increase omega-3 index, rather than taking fish oil supplements as the former is the natural route and supplies EPA/DHA in dilute form i.e. the oil is dispersed in fish flesh and is absorbed slowly, probably with enhanced bioavailability. Recent research indicates that supplementing with high-dose DHA contributes more to raising the omega-3 index than supplementing with high-dose EPA (4). Most oily fish species supply adequate amounts of EPA/DHA in an average serving (5). However, time of season may have a major effect on the content of EPA/DHA with amounts particularly low post-spawning for many species.

Practical use of the omega-3 index

Currently the omega-3 index is not used in Irish hospitals as an indicator of CHD risk. This may be due to the need for further validation in large scale clinical trials (3). In the interim, it is suggested that omega-3 index analysis be run alongside tests for cholesterol (HDL/LDL) and triglycerides in patients attending cardiac departments/clinics thereby building a database to support use of the omega-3 index as a key indicator of CHD risk. Analysis of fatty acid profiles in biological materials is a routine procedure in many biochemistry laboratories and costs less than €6/sample.

References:

1. Harris, W.S. 2008. *American Journal of Clinical Nutrition*, 87, 1997S-2002S.
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3. von Schacky, C. 2014. *Nutrients*, 6(2), 799-814.
4. Allaire, J. et al. 2017. *Prostaglandins, Leukotrienes & Essential Fatty Acids*, 120, 8-14.
5. Zotos, A. & Vouzanidou, V. 2012. *Food Sci. & Technol. International*, 18 (2), 139-149.

The previous 23 issues of *Seahealth-ucd* can be viewed at:
<http://www.ucd.ie/foodandhealth/newsevents/outputs/>

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