Reference:

Bioavailability of Marine n-3 Fatty Acid Formulations

Dyerberg, J. et al., Prostaglandins, Leukotrienes and Essential Fatty Acids

Department of Human Nutrition, Univ. of Copenhagen, Copenhagen, Denmark

Summary:

Preparations of DHA/EPA concentrates in supplemental form as widely sold are commonly available as ethyl ester (EE) or triglyceride (TG) forms. The present study attempted to compare the bioavailability of the different forms of DHA/EPA such that the daily dose of ingested (DHA plus EPA) was similar (3.1-3.6 gms/daily) across the different preparations which were compared – namely, re-esterified TG, EE, FFA (free fatty acid), fish body oil (natural TG form), and cod liver oil (natural TG form). The omega-3 supplements were each given twice daily at meal times for 2 weeks and the net rise of the (DHA plus EPA) as differences between serum lipid concentrations at the end of the study relative to baseline was used to compare and assess relative bioavailabilities.

The bioavailability of DHA/EPA from the TG (re-esterified) form was found to be significantly better than for the EE form. By assigning an apparent ‘bioavailability index’ of 100 % for the rise in circulating DHA plus EPA found with natural fish oil, there-esterified TG form was determined to have an ‘index’ of 124 % as compared to only 73 % for the EE form. An intermediary ‘index’ of 91 % was found for the FFA form. Interestingly, even though essentially identical intakes of the TG and EE forms were ingested daily (1.85 and 1.87 grams, respectively), the net rise of EPA in the circulating serum phospholipid was found to be markedly greater (by 62%) for the TG (re-esterified) form.

Dr. Holub’s Comments:
The present study has potentially major implications in influencing the preferences of both health professionals and consumer choices when choosing omega-3 supplementation since the EE form (as a concentrate) is widely sold and is usually less expensive than the re-esterified form (of equivalent DHA/EPA contents) since there is a processing cost in going from an EE concentrate into a corresponding TG (re-esterified) form. Thus, based on the present study, cost comparisons for a given supplement (having equal amounts of DHA/EPA in either the EE or TG form) appear to warrant consideration of relative bioavailability in determining the more economical selection of a product for targeting the desired health outcomes.

It should be noted that Dr. Clemens Von Schacky and colleagues from the Univ. of Munich presented their results (at the ISSFAL Meeting in Maastricht from May 29-June 2, 2010) where the DHA/EPA Omega-3 Institute had representation. The Munich group compared the TG versus EE forms providing identical intakes of DHA (672 mg/day) and EPA (1008 mg/day) over a very extended duration of 6 months to groups totalling 150 volunteers. By measuring blood levels of DHA/EPA, they concluded that supplementation as the TG form gave a significantly faster and higher increase in circulating levels as compared to the EE form. This group also advised that such differences should be considered when making intake recommendations for long-chain omega-3 fatty acids.