

**Towards Establishing Dietary Reference Intakes for Eicosapentaenoic and Docosahexaenoic Acids.** William S. Harris et al. *J Nutr* 2009;139(4):804S-819S.

There is considerable interest in the impact of (n-3) long-chain PUFA in mitigating the morbidity and mortality caused by chronic diseases. In 2002, the Institute of Medicine concluded that insufficient data were available to define Dietary Reference Intakes (DRI) for eicosapentaenoic acid (EPA) or docosahexaenoic acid (DHA), noting only that EPA and DHA could contribute up to 10% toward meeting the Adequate Intake for  $\alpha$ -linolenic acid. Since then, substantial new evidence has emerged supporting the need to reassess this recommendation. Therefore, the Technical Committee on Dietary Lipids of the International Life Sciences Institute North America sponsored a workshop on 4–5 June 2008 to consider whether the body of evidence specific to the major chronic diseases in the United States—coronary heart disease (CHD), cancer, and cognitive decline—had evolved sufficiently to justify reconsideration of DRI for EPA+DHA. The workshop participants arrived at these conclusions: 1) consistent evidence from multiple research paradigms demonstrates a clear, inverse relation between EPA+DHA intake and risk of fatal (and possibly nonfatal) CHD, providing evidence that supports a nutritionally achievable DRI for EPA+DHA between 250 and 500 mg/d; 2) because of the demonstrated low conversion from dietary ALA, protective tissue levels of EPA+DHA can be achieved only through direct consumption of these fatty acids; 3) evidence of beneficial effects of EPA+DHA on cognitive decline are emerging but are not yet sufficient to support an intake level different from that needed to achieve CHD risk reduction; 4) EPA+DHA do not appear to reduce risk for cancer; and 5) there is no evidence that intakes of EPA+DHA in these recommended ranges are harmful.

**$\alpha$ -Linolenic acid supplementation and conversion to n-3 long-chain polyunsaturated fatty acids in humans.** J. Thomas Brenna et al. *PLEFA* 2009;80(2-3):85-91.

**Abstract:** Blood levels of polyunsaturated fatty acids (PUFA) are considered biomarkers of status. Alpha-linolenic acid, ALA, the plant omega-3, is the dietary precursor for the long-chain omega-3 PUFA eicosapentaenoic acid (EPA), docosapentaenoic acid (DPA), and docosahexaenoic acid (DHA). Studies in normal healthy adults consuming western diets, which are rich in linoleic acid (LA), show that supplemental ALA raises EPA and DPA status in the blood and in breast milk. However, ALA or EPA dietary supplements have little effect on blood or breast milk DHA levels, whereas consumption of preformed DHA is effective in raising blood DHA levels. Addition of ALA to the diets of formula-fed infants does raise DHA, but no level of ALA tested raises DHA to levels achievable with preformed DHA at intakes similar to typical human milk DHA supply. The DHA status of infants and adults consuming preformed DHA in their diets is, on average, greater than that of people who do not consume DHA. With no other changes in diet, improvement of blood DHA status can be achieved with dietary supplements of preformed DHA, but not with supplementation of ALA, EPA, or other precursors. **Keywords:** ISSFAL Statement; Omega-3 fatty acid supplementation; Human PUFA nutrition.

**Dietary  $\alpha$ -Linolenic Acid, EPA, and DHA Have Differential Effects on LDL Fatty Acid Composition but Similar Effects on Serum Lipid Profiles in Normolipidemic Humans.** Sarah Egert. *J Nutr* 2009;139(5):861-868.

Our aim was to study the effects of increased dietary intake of  $\alpha$ -linolenic acid (ALA), eicosapentaenoic acid (EPA), or docosahexaenoic acid (DHA) on serum lipids and LDL fatty acid compositions. To this end, a controlled parallel study was conducted in 74 healthy normolipidemic men and women aged 19–43 y. Participants were randomly assigned to 1 of 3 interventions and consumed a total intake of 4.4 g/d ALA (ALA group), 2.2 g/d EPA (EPA group), and 2.3 g/d DHA (DHA group) for 6 wk. Fatty acid ethyl esters were incorporated into margarines, which replaced the participant's normal spread. The ALA, EPA, or DHA intake led to a significant enrichment of the LDL with the respective (n-3) fatty acid. In addition, LDL EPA contents in the ALA group increased by 36% ( $P < 0.05$ ) with no changes in LDL DHA. The EPA intervention led to an additional enrichment with DHA (24%;  $P < 0.001$ ), whereas the DHA intervention further increased the amount of EPA (249%;  $P < 0.001$ ). ALA, EPA, or DHA intake did not affect fasting serum concentrations of total and LDL cholesterol, but fasting serum triacylglycerol concentrations significantly decreased in the EPA ( $-0.14$  mmol/L) and DHA ( $-0.30$  mmol/L) interventions and also in the ALA intervention ( $-0.17$  mmol/L). DHA intake significantly increased serum HDL cholesterol, whereas no changes were found with ALA or

EPA intake. In conclusion, the present data support the hypothesis that isolated dietary ALA, EPA, and DHA intakes lead to differential enrichment in LDL due to interconversion. Moderate amounts of ALA, EPA, and DHA are effective in improving lipid profiles of normolipidemic humans.

**A Systemic Review of the Roles of n-3 Fatty Acids in Health and Disease.** Natalie D. Riediger et al. *J Am Diet Ass* 2009;109(4):668-679.

Attention to the role of n-3 long-chain fatty acids in human health and disease has been continuously increased during recent decades. Many clinical and epidemiologic studies have shown positive roles for n-3 fatty acids in infant development; cancer; cardiovascular diseases; and more recently, in various mental illnesses, including depression, attention-deficit hyperactivity disorder, and dementia. These fatty acids are known to have pleiotropic effects, including effects against inflammation, platelet aggregation, hypertension, and hyperlipidemia. These beneficial effects may be mediated through several distinct mechanisms, including alterations in cell membrane composition and function, gene expression, or eicosanoid production. A number of authorities have recently recommended increases in intakes of n-3 fatty acids by the general population. To comply with this recommendation a variety of food products, most notably eggs, yogurt, milk, and spreads have been enriched with these fatty acids. Ongoing research will further determine the tissue distribution, biological effects, cost-effectiveness, and consumer acceptability of such enriched products. Furthermore, additional controlled clinical trials are needed to document whether long-term consumption or supplementation with eicosapentaenoic acid/docosahexaenoic acid or the plant-derived counterpart ( $\alpha$ -linolenic acid) results in better quality of life.

**Ethnic differences in early pregnancy maternal n-3 and n-6 fatty acid concentrations: an explorative analysis.** Manon van Eijsden et al. *Br J Nutr* 2009;101(12):1761-1768.

**Abstract:** Ethnicity-related differences in maternal n-3 and n-6 fatty acid status may be relevant to ethnic disparities in birth outcomes observed worldwide. The present study explored differences in early pregnancy n-3 and n-6 fatty acid composition of maternal plasma phospholipids between Dutch and ethnic minority pregnant women in Amsterdam, the Netherlands, with a focus on the major functional fatty acids EPA (20 : 5n-3), DHA (22 : 6n-3), dihomo- $\gamma$ -linolenic acid (DGLA; 20 : 3n-6) and arachidonic acid (AA; 20 : 4n-6). Data were derived from the Amsterdam Born Children and their Development (ABCD) cohort (inclusion January 2003 to March 2004). Compared with Dutch women (n 2443), Surinamese (n 286), Antillean (n 63), Turkish (n 167) and Moroccan (n 241) women had generally lower proportions of n-3 fatty acids (expressed as percentage of total fatty acids) but higher proportions of n-6 fatty acids (general linear model;  $P < 0.001$ ). Ghanaian women (n 54) had higher proportions of EPA and DHA, but generally lower proportions of n-6 fatty acids ( $P < 0.001$ ). Differences were most pronounced in Turkish and Ghanaian women, who, by means of a simple questionnaire, reported the lowest and highest fish consumption respectively. Adjustment for fish intake, however, hardly attenuated the differences in relative EPA, DHA, DGLA and AA concentrations between the various ethnic groups. Given the limitations of this observational study, further research into the ethnicity-related differences in maternal n-3 and n-6 fatty acid patterns is warranted, particularly to elucidate the explanatory role of fatty acid intake v. metabolic differences. **Key Words:** [Long-chain polyunsaturated fatty acids](#); [Ethnic groups](#); [Pregnancy](#); [Amsterdam Born Children and their Development study](#).