

# Clinical Update

## Omega-3: ALA intakes enough for EPA/DPA levels for non-fish eaters?

The conversion of the plant-based omega-3 ALA to the long-chain EPA and DHA may be increased in vegans and vegetarians who do not eat fish, suggest results from the European Prospective Investigation into Cancer and Nutrition (EPIC).

(*American Journal of Clinical Nutrition*, November 2010)  
(*Nutrition Reviews*, June 2008)

Despite having significantly lower intakes of EPA and DHA (associated with fish consumption), blood levels of EPA and DHA in vegans and vegetarians were approximately the same as regular fish eaters, according to findings published in the *American Journal of Clinical Nutrition*. The results indicate that when people do not consume adequate levels of EPA and DHA, like vegans and non-fish-eating vegetarians, their bodies respond by increasing the conversion levels of ALA to EPA.

*"The implications of this study are that, if conversion of plant-based sources of n-3 PUFAs were found to occur in intervention studies, and were sufficient to maintain health, it could have significant consequences for public health recommendations and for preservation of the wild fish supply,"* wrote the researchers, led by Ailsa Welch from the University of East Anglia in England.

### Background

Alpha-linolenic acid (ALA) omega-3 is an essential fatty acid that the body cannot make, and therefore must be consumed in the diet. Good sources of ALA include: flaxseed, soybeans, walnuts, and olive oil. The U.S Institute of Medicine recommends an ALA intake of 1.6 grams per day for men and 1.1 grams per day for women.

The health benefits associated with alpha-linolenic acid (ALA) consumption include cardiovascular effects, neuro-protection, a counter to the inflammation response, and benefits against autoimmune disease. However, the longer-chain eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) have received more study from scientists and more attention from the consumers.

Much attention has been paid to the conversion of ALA to the longer chain EPA, with many stating that this conversion is very small. According to an article in *Nutrition Reviews* (Vol. 66, pp. 326-332), between eight and 20% of ALA is converted to EPA in humans, and between 0.5% and 9% of ALA is converted to DHA. In addition, the gender plays an important role with women of reproductive age reportedly converting ALA to EPA at a 2.5-fold greater rate than healthy men.

This conversion obviously contributes to the body's pool of EPA and DHA, which play a key role in, amongst other things, maintaining cardiovascular health.

### Study details

Dr Welch and her co-workers analyzed intakes of omega-3 polyunsaturated fatty acids (PUFAs), and correlated with blood levels of ALA, EPA, and DHA in fish-eaters and non-fish-eating meat-eaters, vegetarians, or vegans. The researchers included 14,422 men and women aged between 39 and 78 participating in the EPIC-Norfolk cohort. Blood levels of fatty acids were measured in 4,902 people.

Results showed that omega-3 intakes were between 57 and 80 percent lower in the non-fish-eaters, compared with fish-eaters. However, for plasma levels of DHA and EPA between the groups the differences were much smaller. Indeed, the average EPA level in fish eaters was 64.7 micromoles per liter, compared with 57.1, 55.1, and 50 micromoles per liter for non-fish-eating meat-eaters, vegetarians, or vegans. Furthermore, the average DHA level in fish eaters was 271 micromoles per liter, compared with 241.3, 223.5, and 286.4 micromoles per liter for non-fish-eating meat-eaters, vegetarians, or vegans.



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*“One explanation for this observation may be due to increased conversion, and our data suggest that the precursor-product ratio from plant-derived ALA to circulating long chain n-3 PUFAs was significantly greater in non-fish eaters than in those who ate fish,”* wrote the researchers.

*“Although there have been many small, careful metabolic studies determining the extent of conversion, we believe this to be the first large population study to investigate intakes, status, and the precursor-product ratio by using statistical models as, surrogate, estimates of conversion of ALA to long chain n-2 PUFAs in different dietary habits.”*

## **Biochemistry**

The conversion of ALA to EPA involves the delta6-desaturase enzyme to form stearidonic acid (SDA). An enzyme (malonyl co-enzyme A) then elongates the SDA from an 18-carbon chain to a 20-carbon chain, and further desaturation, this time by the delta5-desaturase enzyme, results in the production of EPA.

(Source: [www.nutraingredients.com](http://www.nutraingredients.com))

