

Omega-3 ALA - overlooked and misunderstood?

With marine omega-3 EPA and DHA often stealing the spotlight, ALA from plants has been somewhat ignored, but a new review reinforces ALA's unique and valuable benefits.

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.

"For many years, the importance of the only member of the omega 3 family considered to be essential, alpha-linolenic acid (ALA), has been overlooked," states a special article published in this month's *Nutrition Reviews*.

The review, by Aliza Stark and Ram Reifen from the Hebrew University of Jerusalem and Michael Crawford from the Institute of Brain Chemistry and Human Nutrition at London Metropolitan University, is concise, timely and necessary as consumer awareness and interest in omega-3 grows.

Apparent confusion and misunderstanding manifested itself recently when the British consumer watchdog "Which?" published a report calling for better distinction between the omega-3 fatty acids on products. The University of Oxford's Dr Alex Richardson told "Which?": "The type of omega-3 found in oily fish is the best kind. There's no question that EPA and DHA are vital for our hearts, brains and immune systems. "But some food labels are muddling together things that have different biological effects. Omega 3 from vegetarian sources is very different and does not have the same health benefits."

But not having the same health benefits does not mean lesser health benefits. However, the new review states: "*It is important to remember that of the omega-3 fatty acids, ALA is the parent molecule, and greater attention should be paid to its independent physiological function.*"

The omega-3 family

ALA is derived from plant sources such as flaxseed. EPA and DHA are derived from marine sources such as oily fish, and DHA can also be derived from microalgae. 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 the review, between eight and 20 per cent of ALA is converted to EPA in humans, and between 0.5 and nine percent 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.

Moreover, **benefits such as improved vascular tone, heart rate, blood lipid levels, inflammatory responses, blood pressure, and reduced hardening of the arteries, have also been "associated specifically with ALA consumption,"** wrote Stark, Crawford, and Reifen.

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. These enzymes are also involved in the elongation of the omega-6 fatty acids found in plants, with linoleic acid converted to gamma-linolenic acid (GLA) and then to arachidonic acid (ARA).

Omega-3 versus omega-6

Competition for the 6-desaturase enzyme in the metabolism of both ALA and linoleic acid may have an important role to play in the inflammatory response. By increasing the intake of ALA, the 6-desaturase available will produce less ARA from linoleic acid, so the argument goes.

"It is thought that a higher relative intake of omega-6 fatty acids increases production of arachidonic acid (20:4n-6), which in turn is used to produce pro-thrombotic and pro-inflammatory omega-6 metabolites," wrote the researchers.

"Metabolites of omega-3 origin are anti-inflammatory and anti-arrhythmic. A high omega-6:omega-3 ratio is thought to promote the pathogenesis of many diseases, including cardiovascular disease, cancer, osteoporosis, and inflammatory and autoimmune diseases," they added.

Recommendations

The review does not question the health benefits of EPA or DHA, but calls for more attention to be paid for the short chain fatty acid, ALA. Interestingly, dietary recommendations currently exist for ALA, but not EPA or DHA. "The fact that several major scientific and medical associations have published nutritional guidelines including recommendations specifically for ALA emphasizes its perceived importance in health promotion and disease prevention," wrote Stark.

An opportunity to review the above report was welcomed by ALA omega-3 suppliers in North America. Linda Pizzey, CEO, Pizzey's Nutritionals said the authors should be "*complimented on their timely and very thorough review of the scientific controversies surrounding the much maligned ALA. It is indeed true when they mention that ALA 'has been overlooked'.*"

Pizzey said that strong science exists to support that **ALA has its own unique benefits in maintaining heart health - in particular through antiarrhythmic, antithrombotic and antiinflammatory properties.**

"One particular statement of the authors is indeed refreshing to what so many of us who have been involved in the flaxseed industry, and to many researchers and NGO representatives who have supported our efforts, have known for a very long time:...

ALA has cardioprotective effects in its own right."

Dr. John Minatelli, senior VP business development at Florida-based Valensa International, called the article a "*refreshing and comprehensive review*".

He told this website: "*We believe that there is a growing level of scientific data supporting the idea that ALA in and of itself is biologically significant for two key reasons:*

ALA effectively and efficiently competes with LA for delta 6-desaturase conversion to downstream metabolites with an expected lowering of the related arachidonic acid based metabolites that would otherwise produce a pre-disposal to a highly pro-inflammatory state, and:

ALA is very likely a safer way of supplementing EPA levels in man than direct use of EPA found in fish oils because of EPA's well documented anti-thrombotic effects in man. Most physicians have already recognized this issue and have taken their pre-operative patients off fish oil supplementation well in advance of major surgical procedures to avoid excessive bleeding."

He also said that results of a clinical study published in the *Journal of Nutrition* in 2006 (Vol. 136, pp. 83-87) did a "*good job of addressing and debunking the assertion of people in our industry that ALA does not convert well to EPA, but more importantly indicates that the conversion of ALA to EPA and DHA can occur even when very high levels of LA are present in plasma, a fact that many scientists do not yet fully appreciate.*"

Source: Stark A H, Crawford M A, Reifen R. Update on alpha-linolenic acid. *Nutrition Reviews*, Volume 66, Issue 6, Pages 326-332