

Science: Is omega-3 omnipotent?

02-Sep-2008 - **From heart health to better brain function, from reducing the risk of cancers to improving people's moods, is there nothing omega-3 can't do? In the first part of a four-part focus on omega-3 fatty acids, we review the science behind the headlines.**

Different omega-3s, different benefits?

The main omega-3 fatty acids present on the market consist of the marine sourced eicosapentaenoic acid (EPA, C20:5 n-3) and docosahexaenoic acid (DHA, C22:6 n-3) and alpha-linolenic acid (ALA, C18:3 n-3) from plants like flax.

The omega-3s are not created equal, and different fatty acids have been associated with different benefits.

Much attention has been paid to the conversion of ALA to the longer chain EPA, with many stating that this conversion is very small. Indeed, between 8 and 20 per cent of ALA is reportedly converted to EPA in humans, and between 0.5 and 9 per cent 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.

Cardiovascular health

The strongest and most established body of science for the marine omega-3 fatty acids is in relation to cardiovascular health, first reported by Danish scientists in the early 1970s.

In addition to a lower risk of cardiovascular disease (CVD) risk, research has also linked omega-3 fatty acids to improved heart rhythms, and a reduced risk of a second heart attack.

Indeed, the first report of the reduced risk of a second heart attack was published in 2006 in *The American Journal of Cardiology* (Vol. 97, pp. 1127-1130) by researchers from the Mid America Heart Institute and the University of Missouri.

Only yesterday, Italian researchers reported that a daily supplement of omega-3 polyunsaturated fatty acids (EPA and DHA) may reduce mortality and admission to hospital for cardiovascular reasons in patients with heart failure by 8 and 9 per cent, respectively.

For ALA, a recent review by Israeli and British researchers reported that the vegetarian omega-3 does have cardiovascular benefits such as improved vascular tone, heart rate, blood lipid levels, blood pressure, and reduced hardening of the arteries (*Nutrition Reviews*, Vol. 6, pp. 326-332).

Cognitive performance

The second most established area of research, particularly for the marine omega-3 fatty acids, is cognitive performance and reducing the rate of age-related cognitive decline.

Two studies published in April 2007 in the *American Journal of Clinical Nutrition* reported that regular consumption of omega-3-rich food could prevent age-related cognitive decline.

The studies, from the Dutch National Institute for Public Health and the Environment, and the University of North Carolina, stated that only a limited number of studies have looked at the decline in cognitive function that precedes these diseases.

Researchers have started focussing their attention on Alzheimer's disease. A pre-clinical study, supported by DHA-supplier Martek, reported that DHA may cut the build-up of a certain protein linked to Alzheimer's (*Journal of Neuroscience*, April 2007, Vol. 27).

The study used genetically modified mice, and is reported to be the first study to show that DHA may slow the accumulation of a protein, tau, that leads to the development of neurofibrillary tangles, one of two signature brain injuries of Alzheimer's disease.

Recently, researchers from the University of California, Los Angeles (UCLA) used cells from mice, rats, and humans to show that the DHA-induced production of the protein LR11 may cut the build-up of plaque from beta-amyloid deposits (*Journal of Neuroscience*, Dec. 2007, Vol. 27, pp. 14299-14307).

Results of a clinical trial published in the *Archives of Neurology* (Vol. 63, pp. 1402-1408) reported that a daily supplement of 1720 mg DHA and 600 mg EPA showed promise for the slow mental decline in people with very mild Alzheimer's disease, but had no impact on people with more advanced forms.

Mood and behaviour

Linked to cognitive performance are reports that supplements of the fatty acids may improve mood and behaviour. Several studies have reported that supplementation with EPA and DHA may result in improvements in behaviour and learning of children, although such studies have their critics.

In terms of mood, several studies, such as the French study published earlier this year in the *American Journal of Clinical Nutrition*, have reported benefits for omega-3 and symptoms of depression (May 2008, Vol. 87, pp. 1156-1162).

Moreover, a joint Anglo-Iranian study reported that depression ratings were cut by 50 per cent following daily one gram supplements of EPA, an effect similar to that obtained by the antidepressant drug fluoxetine, according to findings published in the *Australian and New Zealand Journal of Psychiatry* (2008, Vol. 42, pp. 192-198).

However, the science overall is insufficient to support a link between omega-3 and depression, said the *British Medical Journal's Drug and Therapeutics Bulletin* (DTB) in February 2007.

Cancer

A small number of epidemiological and animal studies have reported potential role of omega-3 in the prevention of certain cancers, such as breast, prostate, and colorectal cancer.

However, various experts in this field still question if the fatty acids offer primary prevention.

Eyes

Looking further afield, the fatty acids may also play a role in maintaining eye health and reducing the risk of conditions such as age-related macular degeneration (AMD), the leading cause of blindness in the over-fifties.

It is known that omega-3 fatty acids, and particularly DHA, play an important role in the layer of nerve cells in the retina, and studies have already reported that omega-3 may protect against the onset of AMD.

A study published last month in the *American Journal of Clinical Nutrition*, for example, reported that an increased consumption of DHA and EPA may reduce the risk of AMD by about 70 per cent.

ALA may also have eye benefits, according to findings published in the February 2008 issue of the *Archives of Ophthalmology*. Researchers at the Schepens Eye Research Institute in Boston, Massachusetts, and the Massachusetts Eye and Ear Infirmary Cornea Service reported that a topical application of the fatty acid may ease the symptoms of dry-eye syndrome.

Mother and child

A key area for many is the role of omega-3 fatty acids in the healthy development of a foetus during pregnancy. Many studies have already reported the necessity of would-be mothers to ensure high intakes of

omega-3 fatty acids, and concerns over contaminants and pollutants in fish have promoted supplemental forms.

A recent study from Canada, for example, reported that an increased intake of the omega-3 DHA during pregnancy could produce improved motor function in the offspring in later life (*The Journal of Pediatrics*, March 2008, Vol. 152, pp. 356-364.e1).

And increased levels were linked to improved visual, cognitive, and motor development in the offspring, report the researchers from Wayne State University School of Medicine, Detroit and Laval University.

Other health conditions, such as diabetes, skin health, and weight management, may also benefit from increased omega-3 consumption. The science supporting these potential benefits is less established, however.