



***Omega-3 Fatty Acids and Mood Disorders***  
G. Parker et al, *American Journal of Psychiatry*

(This is a simplified summary of the above paper, published in the American Journal of Psychiatry.)

The paper is about omega-3 polyunsaturated fatty acids and their effect on mood disorders.

It reviews a number of research studies conducted on this topic and addresses two main themes: (1) that a shortage of omega-3 fatty acids in the diet may contribute to mood disorders; and (2) that omega-3 fatty acids might be a useful form of treatment for mood disorders.

***Key findings:***

- There appears to be a plausible link between rates of seafood consumption and rates of both depression and Bipolar Disorder, with lower seafood consumption being linked to higher rates of depression and Bipolar Disorder.
- Omega-3 supplementation may have an antidepressant role – although it is unclear whether omega-3 supplementation alone has antidepressant properties or whether it has greater potential as an augmentation to standard antidepressants.
- Much work is needed to determine which omega-3 fatty acid, and in what ratio to omega-6 fatty acids, is likely to have the greatest benefit and in what dose.
- Higher omega-3 levels in the mothers' breast milk have been found to be associated with lower rates of postnatal depression.
- For Bipolar Disorder it remains to be clarified whether omega-3 supplementation has mood-stabilising or antidepressant properties.
- There are great opportunities for further research studies to look into the relevance of the essential polyunsaturated fatty acids to psychiatric, cardiac and other general health areas.

***What are omega-3 fatty acids?***

Omega-3 fatty acids are long-chain polyunsaturated fatty acids found in various plants and marine life. Those found in marine life consist mainly of EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid) and are highly biologically active. In contrast, those from plants (flaxseed, walnuts and canola oil) are usually in the form of alpha-linolenic acid and while the body can convert this into EPA and DHA, it occurs inefficiently to a level of only 10%-15%.

## ***Background***

There has been growing interest in the possible role played by diet – and, in particular, by omega-3 fatty acids – in the increasing rates of depression in Western societies in recent decades.

The Western diet has changed considerably over the past 150 years, with omega-3 polyunsaturated fatty acids from fish, wild game and plants being replaced by saturated fats from domestic animals and omega-6 polyunsaturated fatty acids from common vegetable oils (corn, safflower, and soybean). These changes have led to a ten-fold increase in the ratio of omega-6 to omega-3 fatty acids in the Western diet. Further, during the metabolizing process, omega-6 ‘competes’ in the body with omega-3 in such a way as to reduce the level of omega-3 in the body.

These changes in the level of fatty acids in the diet are thought to be linked to the rise in cardiovascular disease, depression and other neurological disorders, with several epidemiological studies lending weight to such a view.

## ***Seafood consumption and community rates of mood disorders***

The paper cites several studies linking low fish consumption to higher prevalence of major depression in different countries around the world. One study found a strong such link and others added indirect support. For example, seasonal affective disorder was found in one study to be very low in Iceland and Japan, countries where large amounts of fish are consumed. Another study found that people living in the Polar regions developed greater rates of depression, seasonal affective disorder, anxiety and suicide as their diets changed from the traditional one, based largely on fish and fish-eating animals, to a more Western diet. A Finnish study of 3204 adults found that the likelihood of having depressive symptoms was significantly higher among infrequent fish eaters than among frequent eaters.

There have been some negative studies also – including a large cancer prevention trial of antioxidants among 29,133 men in Finland – where no significant association was found between fish consumption or intake of omega-3 fatty acids and depression or suicide rates. However only dietary intake was measured, not actual levels of omega-3 fatty acids, and it is not known if the antioxidant supplementation had any interference effect on the omega-3 levels. Further, the DHA and EPA intake was very low (less than 0.5 g/day). The male-only sample may have also contributed to the negative finding since a subsequent study in Finland showed lower fish consumption to be linked to higher rates of depression in women only.

## ***Bipolar Disorder***

The possible links between seafood consumption and prevalence rates of Bipolar Disorder and schizophrenia have also been the subject of study, with greater seafood consumption found to be linked to lower lifetime prevalence rates of Bipolar Disorders, particularly Bipolar II. No association was found between seafood consumption and rates of schizophrenia.

## *Postpartum Depression*

Another study looked at the wide variations in prevalence of postpartum depression across countries and found that higher national seafood consumption and higher DHA content in mothers' breast milk coincided with a lower prevalence of postpartum depression. (Interestingly, EPA and arachidonic acid (omega-6) in mothers' milk were not found to have any association with prevalence of postpartum depression.)

Clearly, there are strong incentives to find out if omega-3 in fact could prevent postpartum depression, given the interest in finding safe alternatives to antidepressant drug therapy during the perinatal period. It is also felt that omega-3 supplementation may be of benefit as a depression prevention measure during pregnancy, and have additional benefits for the infant's neurological development.

### ***Omega-3 and depression severity***

The authors look at several articles suggesting there are links between polyunsaturated fatty acids and the level of depression. They note that this area of psychiatric research has the advantage of being able to measure the particular biological marker (through blood tests).

Among other things, the reviewed studies showed:

- People with depressive disorders had significantly lower concentrations of omega-3 fatty acids and a significantly higher ratio of omega-6 to omega-3 fatty acids.
- Depression severity is strongly linked to higher ratios of omega-6 long chain fatty acids to omega-3.
- People with major depression had a significantly higher ratio of omega-6 fatty acids to EPA.

### ***Possible mechanisms for links between fatty acid abnormalities and mood disorders***

The authors look at the neurophysiological mechanisms that might explain the relationship between omega-3 polyunsaturated fatty acids and depression.

It appears that the two omega-3 fatty acids, EPA and DHA, compete with the common omega-6 fatty acid, arachidonic acid, by way of a number of complex mechanisms, with the overall effect of inhibiting the production of chemicals that have been linked to depression.

Another mechanism relates to the way DHA is thought to maintain the integrity and fluidity of cell membranes, thereby guarding against the type of changes in cellular signaling that occur in the case of mood disorders.

### ***Treatment studies***

The authors highlight some interesting findings based on reviews of research into omega-3 fatty acids when used as a treatment for mood disorders, including:

- the significant antidepressant effect omega-3 appears to have when used as an augmentation to mood stabilizers for Bipolar Disorder, or to antidepressants for depression

- that higher doses of EPA (when used in conjunction with antidepressant medication) might not necessarily be more effective than lower doses in reducing depression symptoms
- EPA and DHA might have differential antidepressant effects
- Omega-3 might reduce depression and aggression in patients with borderline personality disorder.

### ***Do omega-3 fatty acids induce switching?***

All antidepressant drugs appear to have some capacity to induce 'switching' from depression into mania, although this differs among the drug classes.

In the case of omega-3 fatty acids one study has reported the case of a woman who became hypomanic after taking large daily doses of DHA and of EPA after not having taken antidepressants for 8 months, however she settled completely 2 days after treatment was stopped. Another study noted that out of 300 patients who had been treated with differing omega-3 preparations, there were less than 10 cases of apparent omega-3 induced hypomania or mania and almost all were from flaxseed oil preparations.

### ***Do omega-3 fatty acids link depression to cardiovascular disease?***

The paper then considers whether the well-known association between depression and cardiovascular disease may be explained by a deficiency in omega-3 fatty acids.

Numerous studies have showed that omega-3 fatty acids reduce the risk of cardiac arrest or sudden cardiac death and that a high omega-6 to omega-3 ratio has been reported in the heart muscle of men following sudden cardiac death. Specifically, omega-3 fatty acids are thought to have antiarrhythmic properties and an impact on heart rate variability.

However it is thought that there may be a further (as yet unknown) factor that predisposes someone to both depression and cardiovascular disease – with omega-3 deficiency and a high level of the amino acid 'homocysteine' being two possible determinants.

One study of patients with acute coronary syndrome found that those among them with major depression had significantly lower concentrations of omega-3 and DHA than those without depression, as well as higher omega-6/omega-3 ratios. This was thought to be the first study showing lower omega-3 levels in depressed patients with coronary artery disease, whereas numerous other studies had found low omega-3 levels in people who later develop coronary artery disease.

The authors conclude that a deficiency in omega-3 fatty acids may have a higher-than-previously-thought role in predisposing someone to risk of coronary artery disease and depression.

The paper concludes by highlighting a number of areas where further research could usefully be carried out.

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Updated 22 June 2006