

# Fact Sheet from NIFES

## Marine phospholipids – good for your brain?

**A high dietary intake of marine omega-3 fatty acids results in a high content of these important fatty acids in the brain. Marine phospholipids contain a high level of marine omega-3 fatty acids and play an important role in brain growth and development.**

The western diet has changed considerably over the last century. We are eating increasingly more vegetable omega-6 fatty acids in proportion to omega-3 fatty acids. Previously, omega-3 fatty acids were associated with a positive effect on cardio-vascular diseases. Now we know that these fatty acids, and especially the marine phospholipids, are important for the brain. This has been shown in e.g. epidemiological studies where low intake of seafood can be associated with an increased frequency of mental disorders.

### What are phospholipids?

Phospholipids are a class of lipids consisting of two fatty acids, one phosphate acid and one glycerol molecule. Often, an electrically charged organic molecule is attached to the phosphate acid, which make one end of the phospholipid polar. Phospholipids make up the major components of cell membranes in all biological tissues and are important building blocks for growth and development. They also play an important role in several biological processes, for example during inflammation. Phospholipids in fish and other seafood have a high content of the marine omega-3 fatty acids, which has been shown to be important for people's health.

### Marine phospholipids and the brain

Marine foods are excellent sources of the two long chain omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). DHA is abundant in our central nervous system and is important for brain growth and development, especially during foetal development and during the first childhood years. DHA deficiencies can have a negative impact on the visual system, attention, learning and memory. The impact of EPA on the brain is so far not known.

### Is the dietary source of omega-3 important?

The dietary fatty acids can originate from different sources, which may influence the incorporation of fatty acids in the tissues. A project at NIFES, compared the incorporation of fatty acids



Photo: NIFES

Marine fatty acids, and especially marine phospholipids are important for the brain. The photo shows herring.

from marine fat sources to vegetable sources, soy oil, which does not contain the very long chain omega-3 fatty acids. The sources of marine polyunsaturated omega-3 fatty acids used in the project was cod, salmon, cod liver oil, seal oil, marine phospholipids and ethyl ester from commercially available omega-3 supplements. The incorporation of EPA and DHA in brain, liver and red blood cells were studied in rats. The results showed that all the marine diets increased the level of EPA and DHA in brain, liver and red blood cells, compared to the soy oil diets. The different organs examined also showed an incorporation which was related to the structure of the omega-3 fatty acids as well as concentration of marine omega-3 in the diet. Despite low concentrations of omega-3 in the feed, marine phospholipids gave an incorporation of DHA in the rat brain which was as good as the other sources of marine fatty acids. The impact of this on brain function is so far unknown, and the subject for future experiments.

These results are published in the Master thesis: "The impact of different dietary sources of marine polyunsaturated fatty acids on the fatty acid composition of rat brain, liver and red blood cells" by Anita Røyneberg and is a part of the Docmar project (see [www.docmar.net](http://www.docmar.net)).



Photo: NIFES

Marine food are excellent sources of the unsaturated omega-3 fatty acids. The photo shows salmon.