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Eat twice as much DHA as EPA

Recent epidemiological studies as well as the composition of Omega-3 found in seafood clearly indicates that Omega-3 products targeting cardiovascular health benefits should be formulated to contain at least twice as much DHA as EPA. Historically the most readily available Omega-3 fish oils have been higher on EPA than DHA and as a result dominates drug intervention studies.



It is an already well established fact that regular intake of marine fatty acids are beneficial for cardiovascular health in the general public. Even though we are still far away from approaching a conclusion on what the perfect ratio of EPA to DHA with regards to cardiovascular health is, if such a ratio even exists, there are some quite interesting information available that provides convincing evidence that DHA supplementation is more important also for CVD protection;

Epidemiology and hard endpoints

The cardiovascular health within the Japanese population is far better than is the case for the US population. While the Omega-3 Index* is at 4 or less in the American population it is as high as 8-9 within the Japanese population². In addition the incidence of atherosclerosis is much less in Japanese living in Japan compared to Japanese living in

the USA³. A reasonable approach would therefore be to try to elevate the index to 8-9 also among US citizens by supplementing Omega-3 in a ratio mimicking the ratio of EPA to DHA to that found within the Japanese diet in order to achieve the EPA:DHA ratio found in the red blood cells of the Japanese population.

However before we can safely conclude on the basis of this approach, a few more facts must be considered:

Red blood cells contain 4 times more DHA than EPA.

Human red blood cells (RBC) as well as human milk fat contains typically at least 4 times more DHA than EPA. In a Japanese population (456 healthy individuals), the EPA was 1.6, DHA was 6.8 and the sum 8.5% of the fatty acids within RBC²

*The Omega-3 index (1) is rapidly gaining credit as a measure of the omega-3 status and cardiovascular risk factor. This index is defined as the sum of the omega-3 fatty acids EPA and DHA relative to all fatty acids in Red Blood Cell (RBC) phospholipids. An index of less than 4 is considered to be too low whereas an index of 8 or above is recommended.



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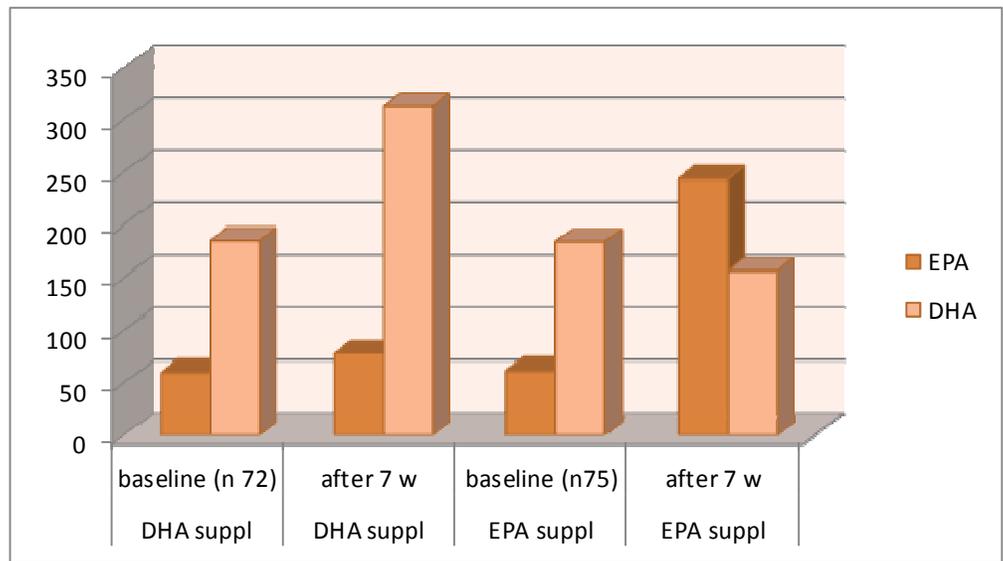


Figure1. Supplementing purified DHA to 72 humans for 7 weeks increased EPA in blood serum phospholipids, while supplementing purified EPA (n=75) actually reduced blood serum DHA⁵

Body easily converts DHA to EPA but not the other way around

The human body can rather easily convert DHA to EPA, while only very small amounts of EPA can be converted into DHA. A study supplementing humans 6 grams of fish oil/day of a very high EPA/DHA ratio product (1790 mg/570 mg) for one year, showed no increase of DHA in blood lipids⁴.

Another study supplementing 4000 mg of pure EPA/day to 75 volunteers actually showed a 15% decrease in DHA (umol/l) in serum phospholipids after 7 weeks. In comparison the EPA levels increased 29% by supplementing 4000 mg pure DHA/day⁵ (Figure 1).

Several other studies supplementing pure DHA have also shown an increase of EPA in RBC phospholipids. In conclusion, DHA levels within blood phospholipids, are not improved by consuming EPA.

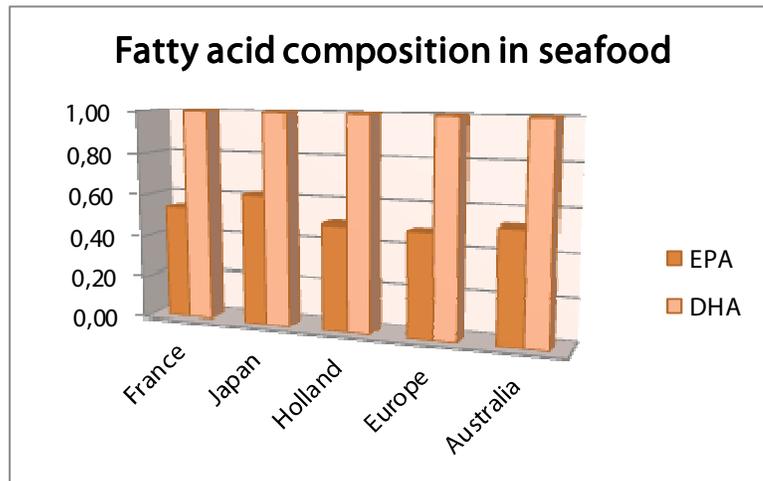


Figure 2. Relative average amounts of dietary intake of EPA to DHA in France (8), Japan (6), the Netherlands (9), Europe (10), and Australia (11).

Seafood contains twice as much DHA as EPA.

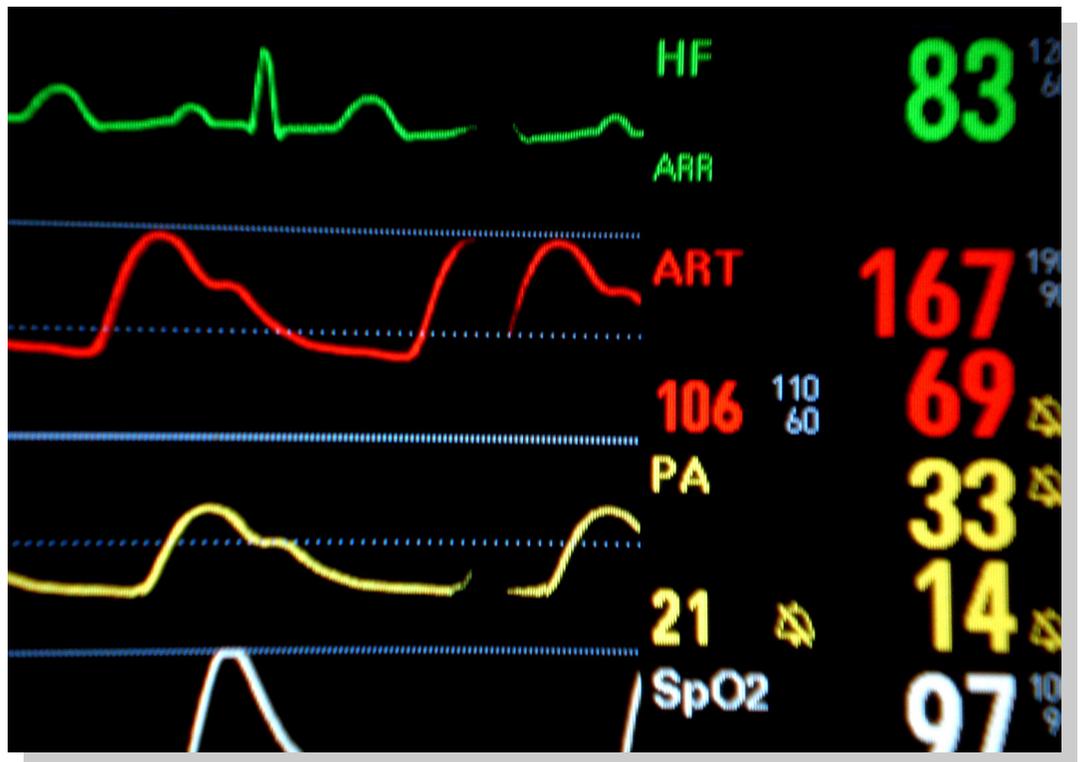
Despite the fact that the cheapest high omega-3 commodity fish oils, originating from Chile and Peru, contain more EPA than DHA (the MaxEPA supplement contains 18% EPA and 12% DHA (7)), seafood consumed worldwide, now and for probably thousands of years, contain approximately twice as much DHA as EPA. This is confirmed by data from France (8), Holland (9), Europe (10), Australia (11) and Japan (6). See Figure 2.



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Isomer specific data on surrogate endpoints

Due to the high availability of high EPA raw materials, the production methods and technology available, as well as little knowledge about the different EFA's in the early days of Omega-3, the first generation drugs that were developed; Omacor (Lovaza) and EPADEL contains more EPA than DHA, 47:38 and 98:<2 percent respectively. Accordingly, data from intervention trials with high or pure EPA on cardiovascular disease/deaths are available. Unfortunately similar data on DHA does not exist at present. However, data on the important surrogate endpoint risk factors comparing EPA and DHA are available;

Triglycerides

EPA and DHA have similar positive effects on lowering triglycerides. (See Appendix 1: Tabulated data with referenced literature)

Cholesterol

Indications are that DHA might slightly increase Ldl-Cholesterol. (See Appendix 1: Tabulated data with referenced literature)

However, the weaknesses of those studies are mathematical rather than measurement of Ldl (Friedewald equation) and further the variations in the type of DHA supplemented ranging from algal with high content of saturated fats as well as Omega-6, to pure DHA in Ethyl Ester (EE) form.

Possibly DHA but not EPA will provide a increase of healthy Hdl-Cholesterol.

Blood pressure and heart rate

Little data is still available, but indications are that DHA are more efficient than EPA in lowering blood pressure. In a double blind placebo study providing either EPA or DHA (4 gram/day), for 6 weeks (type 2 diabetic patients), DHA but not EPA reduced blood pressure and heart rate. The authors concluded: "The results of this study suggest that DHA is the principal Omega-3 fatty acid in fish and fish oils that is responsible for their BP- and HR-lowering effects in humans."¹². Another study showed that also a low dose of DHA (1.5g/day) reduced diastolic pressure after 3 months¹³

C-reactive protein

Data are inconclusive but suggests that both EPA and DHA, especially upon long time intervention and provided dose is not too low, attenuates CRP.



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