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Editorial

Fish Oil? Is it Upgrade to Snake Oil?

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Fish oil companies don't sell snake oil. Perhaps they should…

I have spoken to the management of some of the biggest fish oil companies and they acknowledge (off the record) that their products don't do much. But hey – it's great business. No matter that they are emptying the oceans, making false claims, and taking money from customers who get little more for their hard-earned cash than indigestion and a false sense of security.

And it certainly does seem to be largely false.

Cochrane Collaboration methodology uses a powerful set of investigative tools. They are not particularly well-suited to measuring the effects of nutritional inputs but nonetheless, the Collaboration have published numerous meta-analyses showing that omega 3 HUFA's have no effects in most indications [1-21]; ranging from psoriasis and cognitive decline to gestational diabetes, retinopathy, chronic kidney disease, IBD and ADHD.

There is evidence of possible and slight effects (i.e. not reaching statistical significance) in a few other conditions such as muscle performance, cancer, pre-eclampsia, multiple sclerosis and non-alcoholic fatty liver disease [22-31], but there is nothing really substantial. And in the area of heart health, which is why most consumers swallow fish oil, the data is hopelessly conflicted.

Two recent meta-analyses [32,33] and one large population-based cohort study [34] generated data that suggests that fish oils do reduce various cardiovascular end-points, including atheroma progression. One of the meta-analyses [34] found that the protective effects were dose-related, which is always persuasive. In marked contrast, three recent powerful clinical trials found fish oil to have no effects on cardiovascular pathology in either primary or secondary prevention [35-37]. Yet another meta-analysis found null results, except for a slight degree of protection in subjects who had gallantly taken fish oil supplements for over ten years [38].

These last seven studies are all well-powered, and designed and run by established scientists, but they cannot all be right. Or can they? I think they can … and that the riddle of the sands is based on secondary bioavailability.

Getting omega 3's into the bloodstream (primary bio-availability) is relatively easy because humans are good at absorbing fats and oils, unless they have gall bladder or exocrine pancreatic problems. Despite shrill commercial claims from fish oil vendors for the superior nature of their triglycerides, esters or free fatty acids, they are all broadly similar; and it makes little difference whether they are sourced from algae, krill, fish, whale or Inuit.

None of this matters. Levels of omega 3's in the bloodstream are irrelevant, except in terms of their calorie content. That is not where they do their anti-inflammatory thing.

They become precursors for the pro-resolving resolvins, maresins and protectins, and anti-inflammatory eicosanoids such as PGE3, TXA3 and LTA5, only after they have been incorporated into the host's cell membranes. Getting them into the cell membranes is secondary bioavailability (or bio-efficacy), and this is a much more complicated procedure. Seafood does it, but fish oil doesn't.

I know this because I was given access to a library of over 600,000 dried blood spot samples, generated by Vitas Analytical Services [39]. This is the largest library of its kind in the world by far.

Membrane lipid profiling performed by Vitas shows that those who eschew fish oil have an average 6:3 ratio of 14.8:1 [40]. This is a pro-inflammatory configuration. Consumers who had drunk fish oil for decades and in many cases from birth (forgive them, they are Scandinavian), have slightly higher omega indices and an average 6:3 ratio of 9.9:1 [40]. This is marginally better than the first group, but it is still pro-inflammatory; both of these groups have a 'normal' (i.e. high) incidence of inflammatory disorders.

In marked contrast, fish-eaters have excellent omega indices and 6:3 ratios that are typically between 2 and 3 [40]. This is anti-inflammatory, and this group has far fewer inflammatory problems, showing that fish oil and oily fish are two very different things. Specifically, there is something in oily fish which enables secondary bioavailability, but which is missing in commercial fish oils. As I have long suspected, that something is a lipophilic polyphenol called phlorotannin [41].

Phlorotannin, like many polyphenols, has a range of anti-inflammatory activities which occur down-stream from the omega 3's in the inflammatory cascade [42-50], and are therefore additive or supra-additive. Produced by the same marine algae that produce the omega 3's, they bind the omega 3's tenaciously and act as fantastically effective antioxidants. They are also chaperones, vital in permitting the transfer of the fragile omega 3 HUFA's through multiple trophic levels and over many months until they arrive intact in the apex consumer. They also inhibit MMP enzymes, thus amplifying the anti-inflammatory effects of the omega 3's.

The ability of the phlorotannins to transport omega 3's through the marine food web demonstrates their role in delivering omega 3's through the body of many different species; including us. This is why omega 3's from algal oil achieve the same levels in erythrocyte membranes as they do when consumed in oily fish.

Once we have consumed oily fish, the polyphenols continue to act as chaperones until the omega 3's have arrived safely in the cell membranes. Once there, the omega 3's and phlorotannins cooperate in a different way, generating effective anti-inflammatory cover.

This explains why commercial fish oils do not work. They mostly use versions of vitamin E to protect their oil, forgetting that vitamin E becomes a pro-oxidant in the presence of iron, haem and/or high partial pressures of oxygen. That would explain why fish oil drinkers generally have low omega 3 indices and high 6:3 ratios in their cell membranes, and the poor outcomes of so many clinical trials of fish oil; the omega 3's are largely failing to get to their target site intact.

This is particularly likely to occur in populations whose dietary intake of polyphenols is low, such as North America and Northern Europe. In areas where people eat a diet containing higher levels of polyphenols, however, fish oil supplements would be more likely to show a positive result, however small. This, I believe, is a major factor behind the scientific community's current lack of consensus on the subject. Carotenoid intakes may also play a role, but do not appear to be as effective in maintaining omega 3 integrity.

Alternatively, consume your fish oil containing pre-dissolved lipid-soluble polyphenols, such as those from olive. There are an increasing number of these products, the first of which was Balance Oil.

The dried blood spot library I mentioned earlier shows that Balance Oil drinkers have cell membrane lipid profiles similar to those of sea-food eaters. This shows that Balance oil is not fish oil but effectively an oily fish in liquid form.

Back to the heart of the matter. The omega 3 HUFA's undoubtedly have some ability to dampen endothelial dysfunction, and so do the polyphenols. I and many thousands of others have found that the combination of the two is highly synergistic, and consistently succeeds where fish oil fails. Furthermore, it does not need a prescription. The pharma product Vascepa also shows cardiovascular benefits, but is in my view poorly formulated, potentially harmful and based on outdated science.

Postscript. When I accused fish oil manufacturers of selling snake oil, the sting was in the tail. Snake oil was originally a Chinese remedy derived from water snakes, which live in cool to cold waters. Their oil is approximately 30% EPA, and as that EPA is derived from the base of the marine food web, snake oil will also contain phlorotannins. It was traditionally used to treat arthritis's and other inflammatory conditions, and was almost certainly as effective as Balance oil is today.

When skeptics describe Balance oil as snake oil, they are more right than they know.

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