Fish Oil vs. Krill Oil

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More and more people are taking fish oil and other marine supplements. Why? Because of the extensive health benefits of increased omega-3 intake. Backed by over 40 years of research, omega-3s—eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA)—are essential fatty acids; "essential" means that the body cannot produce these good-for-us fats, hence they must be consumed from diet or supplements. Today the scientific consensus is so strong that health policy makers worldwide, including the American Heart Association (AHA) and the World Health Organization (WHO), all agree that omega-3s maintain health and prevent disease. Omega-3 supplements are one of the fastest growing categories of supplements, and there is an ever-growing array of omega-3 products for the consumer to choose from.

What is Krill?

Recently some companies have started selling krill oil supplements as a source of omega-3. Krill are shrimp-like crustaceans that are a dietary staple for whales, small fish, and seabirds. Krill exist in large numbers and are an integral part of the aquatic food chain.

Sustainability

The increased fishing of krill has lead to grassroots protests and a call to action by The National Oceanic and Atmospheric Administration (NOAA). Scientists, fishery groups, and federal environmental organizations like the NOAA have all voiced concerns about the potential impact of increased krill fishing. Due to these concerns, the fishing of krill has been banned on the West Coast of the US, and has been strictly limited in places like Norway and Antarctica[1].

In contrast, fish oil supplements are predominantly produced from sardines and anchovies, species that are currently in abundant supply, fished well below mandated limits, and are considered ideal species for sustainability, given their short reproductive cycles. A study published in the journal, *Science*, by marine conservation biologists also suggested that fishing should concentrate more on these pelagic species, in order to reduce the dependence on fish species currently threatened by overfishing[2].

Omega-3 Concentration

Whereas krill oil generally provides 7–24% omega-3s (EPA and DHA), and about 0.2% astaxanthin, a reddish carotenoid pigment, fish oil naturally contains about 30% omega-3s (EPA and DHA). Concentrated fish oil formulas, produced through molecular distillation or other processing of natural fish oil, contains up to 98% omega-3s (EPA and DHA). Fish oil also typically contains 0.25–0.50% antioxidants as added oil stabilizers.

Stability

Krill contains the antioxidant, astaxanthin, which makes up 0.2% of the oil by weight. This percentage is not sufficient to offset krill's rapid decomposition, which occurs in only 2–3 hours. Fish oil has a significantly longer interval of decomposition, about 48–72 hours, which allows ample time for processing with very low oxidative stress. Techniques for optimizing the stability of fish oil have been extensively researched and have long been established; adding approximately 0.25–0.5% of vitamin E and rosemary extract (fat-soluble antioxidants) have been proven to be the most effective technique for maintaining oil freshness. This combination of antioxidants provides, at a minimum, an equal Oxygen Radical Absorbance Capacity (ORAC) value when compared to krill oil.

Research-Proven

To date, there are only 3 published human studies conducted with krill oil, whereas over 8,000 clinical human studies have been published on fish oil. Marketing of krill oil has recently included claims about being "faster absorbed," "more rich than fish oil," etc., which has triggered the involvement of the National Advertising Division of the Council of Better Business Bureau (www.nadreview.org/CaseReports.aspx). A review of the literature shows no evidence or supportive studies for these claims. In response, an agreement has been reached to stop advertising these unsubstantiated claims.

Purity

Even though the US government has not set specific criteria for fish oil products, most fish oil manufacturers hold themselves to strict international standards for safety and purity. (For the strictest purity guidelines in the world, please refer to The World Health Organization). Any fish oil manufacturer that prioritizes quality should be able to supply third-party test results to prove purity and ensure compliance with quality standards. In fact, over 50 fish oil manufacturers have had their products tested for impurities by the Environmental Defense Fund, and the majority received commendations for conforming to the strictest standards for safe levels of contaminants and toxins.

Absorption

In order for an oil to reach maximum absorption AND utilization by the body, it needs to be fresh. Freshness is measured by laboratory methods that evaluate the degree of oxidation in the oil, which is measured in terms of the oil's peroxide value and anisidine value. Oxygen breaks apart the bond of omega-3 molecules and creates free radicals, which can have a negative effect on human health. Whether produced from krill or fish, omega-3s that have been oxidized (i.e. that are not fresh) often have a poor taste and smell, and will not supply the health benefits for which these essential fatty acids are known. Consequently, the freshness values (peroxide and anisidine values) of the omega-3 supplement are crucial to avoiding poor taste, achieving optimal absorption, and thus to receiving the health benefits of increased omega-3 consumption.

Consider the Fat

When manufacturing a raw material for its omega-3 content, it is important to consider its fat percentage. Sardines and anchovies yield greater than 80% fat, while krill yields less than 5% fat, which causes decomposition to occur within hours and thus becomes a significant obstacle for its manufacture. To reduce decomposition and oxidation, krill need to be kept alive in water tanks, or frozen until processing. This substantially increases the cost of getting the raw material to shore for processing. As a result, the average wholesale cost for krill oil is around $230/kg, compared to natural fish oil that is priced around $10/kg. Given these considerations, sardines and anchovies are not only more ecologically sustainable but also a more economical source for omega-3 supplements.

Is Krill Oil Pure?

Due to the high cost of the krill raw material explained previously, it is not uncommon for manufacturers to mix krill oil with fish oil. Astaxanthin and phospholipids (PL) can also be added to mimic 100% krill oil. Claims of krill's superior absorption (which are now ending due to the National Advertising Division's involvement) are based on PL and DHA levels. Krill oil contains under 10% DHA, on average. Fish oil contains a minimum of 12% DHA, increasing to over 75% after concentration. Although fish oil initially has no DHA bound directly to PL (but rather it is a triglyceride), it is easily bound to PL in the body. In fact, all DHA molecules in the human body are bound to PL. Fish oil also contains a minimum of 18% EPA, which, along with DHA, is the other health-promoting omega-3. Krill contains about 14% EPA.

Strict Standards

The fish oil industry has driven the development of technology to greater and greater precision for detecting environmental toxins such as mercury, heavy metals, PCBs, dioxins, pesticides, and other toxins (some of which are nameless as of yet.) This technology can quantify these molecules down to parts per billion and even parts per trillion. Properly manufactured, high quality fish oils have no detectable contaminants, even at these extremely low levels, and should be able to verify that purity with third-party lab results.

In conclusion, although, at this point in time, not all fish oil or krill oil companies follow international quality standards, fish oil does have a proven record of safety, efficacy, purity, and sustainability when manufactured according to the standards of the European Pharmacopeia and the World Health Organization. There may be more science behind omega-3 essential fatty acids than any other single natural supplement. Research has shown that omega-3s benefit every cell, tissue, organ, and system in the human body and that the best source of omega-3s is a high quality fish oil supplement.

References

1 By the states of California, Oregon, and Washington, in response to groups such as NOAA, Pacific Fishery Management Council, Antarctic and Southern Ocean Coalition, Convention on the Conservation of Antarctic Marine Living Resources, The Ocean Research Institute of Norway, and Antarctic Krill Conservation Project (www.krillcount.org).

2 Boris Worm, *et al*. Impacts of Biodiversity Loss on Ocean Ecosystem Services. *Science* 2006;314:787–790.