ConsumerLab.com®
Celebrating 14 Years of Reporting 1999 – 2013
Be Sure It's CL Approved
Our Mission: To identify the best quality health and nutritional products through independent testing.
My Account | Sign Out | Contact Us
Welcome **Bonnie**
Not Bonnie? Click Here.
Gift Membership
Home | Product Tests | -- Select a Review -- | Warnings | Encyclopedia | News | Where to Buy | Type Search Term Here | SEARCH
Print

Product Review: *Fish Oil and Omega-3 Fatty Acid Supplements Review (Including Krill, Algae, and Calamari Oil)*

Initial Posting: 8/10/12 Last Updated: 3/9/13

Photo: ConsumerLab.com

Sections: Jump to a section by clicking on its name.

- What It Is
- What It Does
- Quality Concerns and What CL Tested For
- What CL Found
- *Test Results by Product*
  - Fish Oil Softgels
  - Fish Oil Enteric-coated Softgels
  - Liquid/Gel Fish Oils
  - Krill Oils
  - Fish Oil/Krill Oil Combinations
  - Calamari Oils
  - Vegetarian (Algal Oils)
  - Cod Liver Oils
  - Prenatal Formulas
  - Children's Formulas
  - Pet Formulas
- *The Bottom Line -- Finding Good Quality at Low Cost*
- What to Consider When Buying
- What to Consider When Using
- Concerns and Cautions
- Full List of Ingredients by Product
- How Products Were Evaluated

What It Is:

EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid) are two principal fatty acids found in fish, krill, and calamari. They belong to a family of nutrients known as omega-3 fatty acids. DHA can also be obtained from other marine sources, such as algae (algal oil). EPA and DHA are polyunsaturated fats ("good" fats, as opposed to saturated fats which are thought to increase the risk of heart disease). The body can only manufacture limited amounts of EPA and DHA from the essential fatty acid, alpha-linolenic acid (ALA) -- found in flaxseed oil, canola oil, soy oil and walnut oil. For more information about ALA see the separate review covering ALA and GLA products.

What It Does:

Cardiovascular and Cerebrovascular Disease (Heart Attack and Stroke):

The omega-3 fatty acids EPA and DHA have a number of potentially heart-healthy effects, including reducing triglyceride levels, slightly raising levels of HDL ("good") cholesterol, possibly, "thinning" the blood, reducing levels of homocysteine, and reducing blood pressure. Increased consumption of fish oil may help slow the progression of atherosclerosis, thereby preventing heart attacks, and reduce the risk of sudden death due to cardiac arrhythmias. The U.S. Food and Drug Administration (FDA) permits supplements containing omega-3 fatty acids to state: "Supportive but not conclusive research shows that consumption of EPA and DHA omega-3 fatty acids may reduce the risk of coronary heart disease," and it has approved the use by prescription of a high-dose, highly concentrated EPA/DHA product derived from fish oil (Lovaza) in the treatment of hypertriglyceridemia.

Researchers recently sought to determine if there was conclusive evidence to demonstrate that fish oil supplements reduced the risk of strokes and heart attacks in people with a history of cardiovascular disease. Their review of 14 studies (involving a total of 20,485 patients, each lasting 1 to 4.7 years and using 400 mg to 4,800 mg of EPA and/or DHA per day) found no significant difference in outcomes between those who took or didn't take fish oil supplements (Kwak, Arch Intern Med 2012). Earlier research suggested a benefit for these patients, as well as for healthy individuals. Clinical trials since 2010, however, cast some doubt on this benefit for both groups -- although it has been noted that these studies may have been too short or small to detect small or modest benefits (Hu, Arch Intern Med 2012). Similarly, a study of diabetics and others with poor glucose control and a history of cardiovascular disease found no reduction in cardiovascular events among those who received 900 mg of EPA and DHA daily for about 6 years compared to those who received placebo (olive oil), despite a significant (14.5 mg) decrease in triglycerides (Bosch, NEJM 2012). A potential beneficial effect of the fish oil may have been masked by the fact that participants continued to take other heart medications and already had a median intake of 210 mg of omega-3 fatty acids from their diets.

A systematic review of 20 studies published from 1989 to 2012 (involving a total of 68,680 patients, each lasting from 1 to 6.2 years and using 270 mg to 6,000 mg of EPA and/or DHA per day from supplements) similarly concluded that supplementation with omega-3 fatty acids EPA and/or DHA was not associated with a lower risk of heart attack, stroke, cardiac death, sudden death or all forms of death among people, most of whom were at increased cardiovascular risk and many of whom were taking cardiovascular medication (Rizos, JAMA 2012).

A study looking specifically at cerebrovascular disease (stroke) found no benefit from fish oil supplementation, although there was benefit from fish consumption. The analysis of 38 studies involving a total of nearly 800,000 people found that consuming two to four servings per week of fish was associated with a 6% lower risk of stroke compared to the consumption of one or fewer servings per week (Chowdhury, BMJ 2012). Five or more servings per week of fish had a 12% lower risk. The researchers concluded that this beneficial effect of fish intake is likely due to "a wide range of nutrients abundant in fish." Interestingly, the decreased risk of stroke was only seen with "fatty" fish types and not "white" fish types" -- although this may be explained by the fact that, in the populations studied, white fish types were typically served fried or deep fried.

Based on the current research, the frequently discussed benefits of supplementation with omega-3 fatty acids EPA and DHA in reducing cardiovascular events, such as heart attack and stroke, remain generally unproven, while eating fish at least twice a week may be beneficial.

Arthritis and Other Inflammatory Diseases:

Increased intake of the omega-3 fatty acids in fish oil alter the body's production of substances known as prostaglandins, and, consequently, reduce some forms of inflammation. On the basis of this, EPA and DHA have been tried in the treatment of symptoms of rheumatoid arthritis with considerable success (especially in early stages of the disease). Unlike "disease modifying" drugs, however, fish oil probably doesn't slow the progression of the disease.

The anti-inflammatory effects of EPA and DHA have also caused researchers to investigate possible benefits of fish oil for the treatment of menstrual cramps, inflammatory bowel disease (ulcerative colitis and Crohn's disease), lupus, and IgA nephropathy. For each of these conditions, at least one double-blind study has found positive results. A large European study (Hart 2009) showed that people with the highest consumption of DHA (410 mg to 2,000 mg per day) had a 77% reduction in the risk of developing ulcerative colitis over an average period of four years than those consuming the lowest amount (up to 110 mg per day). Conversely, those consuming the most (15 to 35 grams per day) of linoleic acid (an omega-6 fatty acid) were 2.3 times as likely to develop the disease as those consuming the lowest amount (8 grams - 11 grams per day). However, in Crohn's disease, a trial of four grams per day of omega-3 fatty acids (50-60% EPA and 15-25% DHA) was ineffective at preventing relapses.

Cancer:

Prevention:

Some evidence suggests that fish oil may reduce the risk of cancer of the prostate, colon/rectum, and breast. The latest evidence relating to breast cancer comes from a prospective study of supplement use and breast cancer risk among postmenopausal women (Brasky, Canc. Epidemiol. Biomarkers Prev 2010). Current use (but not past use) of fish oil supplements was associated with a 32% reduction in the risk of breast cancer. A specific dose or frequency of fish oil use associated with the greatest risk reduction was not determined. Risk was greatly reduced for ductal carcinoma of the breast (the most common form of breast cancer), but not lobular carcinoma. This risk reduction was not seen with other supplements commonly taken for menopausal symptoms (black cohosh, dong quai, soy, or St. John's wort). It is speculated that the anti-inflammatory property of fish oil may be responsible for an anti-cancer effect because chronic inflammation is associated with cancer initiation and progression. Researchers note, however, that fish oil cannot be recommended for breast cancer prevention without further study. (See the Review of Cancer Prevention Supplements for information about other supplements used for cancer prevention.)

Results of a prostate cancer prevention study were recently analyzed to determine if blood (serum) levels of omega-3 and -6 fatty acids were associated with prostate cancer. There were no associations with the risk of low-grade prostate cancer but, unexpectedly, elevated levels of DHA (although not EPA, nor EPA plus DHA) were associated with a greater risk of high-grade prostate cancer (Brasky, Am J Epidem 2011). ConsumerLab.com communicated with the researcher, Dr. Theodore Brasky, to understand the implications. He explained that the study did not reflect supplement use and that a soon-to-be-published study of by him shows no association between fish oil supplement use and prostate cancer risk. He also noted that other research has found fish consumption to be associated with a large reduction in late state or fatal prostate cancer (Szymanski, Am J Clin Nutr 2010).

Chemotherapy:

Fish oil may prevent weight loss during cancer chemotherapy. Although some trials have not shown a benefit, a recent study (Murphy, Cancer 2011) showed significant benefit. In this study, patients with non-small cell lung cancer took fish oil throughout initial chemotherapy (approximately 10 weeks). During the course of chemotherapy, patients who did not take fish oil experienced an average weight loss of 5 lbs (of which approximately 2.2 lbs was muscle). Those taking fish oil had, on average, no change in weight despite having lost, on average, 6.3% of their weight over the previous 6 months. In fact, many of those taking fish oil increased their muscle mass -- with the greatest increases corresponding to the greatest increases in plasma EPA concentrations. Cancer response rates to the chemotherapy were similar in the two groups. Patients taking the fish oil were given an option consuming either four 1 gram gelatin capsules per day or 7.5 mL of liquid fish oil per day. Both formulations provided 2.2 grams of EPA per day.

Eye Disease:

Analyses of dietary intakes taken as part of the Age-Related Eye Disease Study (AREDS) show that participants who reported the highest intake of EPA and DHA were 30% less likely to develop diseases of the retina -- neovascular age-related macular degeneration (AMD) and central geographic atrophy (CGA) -- compared to those with the lowest intake (SanGiovanni 2009). Decreased risk of developing AMD was also shown in a study of over 30,000 female health professionals: Those consuming at least one serving per week of fish had a 42% reduction in risk of developing AMD compared to those eating less than one serving per month -- and the benefit was greatest with canned tuna or dark-meat fish (e.g., mackerel, salmon, sardines, bluefish, and swordfish) (Christen, Arch Opthamol 2011). Analyzed another way, the risk of developing AMD in this study was reduced by 38% and 36%, respectively, among those with the highest intakes from their diets of DHA (230 mg median intake) and EPA (100 mg median intake) compared to those consuming the least amount (median intakes of 60 mg of DHA and 10 mg of EPA.) EPA and DHA supplementation are currently being evaluated as treatments for AMD in a related study known as AREDS2. See the Review of Eye Health Supplements for more information about AREDS and AREDS2.

Psychiatric and Mental Disorders:

For reasons that are less clear, omega-3s seem to help depression, bipolar disorder, and schizophrenia according to a limited number of double-blind trials. Fish oil has also been proposed for attention deficit disorder, borderline personality disorder, dyslexia and cognitive impairment, but supporting evidence for these uses remains preliminary.

Depression

A study of depressed older women in a nursing home setting showed that after taking high-dose omega-3 fatty acids for eight weeks (2,500 mg once daily consisting of 1,670 mg EPA and 830 mg DHA), 40.9% had a remission of depression compared to 16.7% of those taking placebo (Rondanelli, J Am Col Nutr 2010). This study also found a statistically significant improvement in the self-assessed quality of life and that the fish oil treatment was well tolerated. In another study, the combination of EPA plus the prescription antidepressant fluoxetine (Prozac) was better than either EPA or fluoxetine alone for treating major depression in a short-term (8-week) study of 60 people. However, a study of people with congestive heart failure and depression failed to show any additional benefit from EPA (930 mg) and DHA (750 mg) daily when added to treatment with the prescription antidepressant sertraline (Zoloft) (Carney, JAMA 2009).

The best evidence for omega-3's has been in cases of major and moderate depression, but not mild depression, and one group of researchers has concluded that the antidepressant benefit is strongly dependent upon the EPA content of the supplement. After pooling and reviewing studies using a total of 1,000 mg to 6,000 mg of EPA and DHA, those in which EPA was 60% or more of the total showed a highly significant improvement, whereas those that were less than 60% EPA did not (Martins, Molec Psy 2012). Other researchers, however, believe that any benefit is, at best, small to negligible (Bloch, Molec Psy 2012). Nevertheless, further analysis of blood samples from the study by Rondanelli (above) found that elderly depression is characterized by very low levels of omega-3s, in particular EPA, in red blood cell membranes compared to those in healthy individuals and that EPA-rich supplementation restored EPA concentrations to normal values (Rizzo, Nutr J 2012).

Suicide

An analysis of blood samples from 1,600 military personnel showed those who committed suicide had, prior to suicide, significantly lower blood levels of DHA than personnel who did not commit suicide (Lewis, J Clin Psychiatry 2011). The population studied was predominantly male and the risk of suicide was found to be 62% greater among men with levels of serum DHA below 1.75% (% of total serum fatty acids) compared to those with higher levels. There was no such relationship with EPA levels. The researchers note that omega-3 fatty acid levels were generally low across the military personnel in the study, much lower than in the general population, and suggested that even greater risk reductions could be possible with higher serum levels of DHA.

Anxiety

A study of U.S. medical students showed, over 12 weeks, that those who received high-dose omega-3 fatty acids (2,496 mg once daily providing 2,085 mg EPA and 348 mg DHA), had a 20% reduction in anxiety symptoms compared to those receiving placebo treatment. Treated students also had a 14% decrease in a marker of inflammation (stimulated IL-6 production) (Kiecolt-Glaser, Brain Behav Immun 2011). The study intentionally used an extremely concentrated fish oil (supplied by OmegaBrite) high in EPA due to evidence that EPA has relatively stronger anti-inflammatory and antidepressant effects than DHA.

Pregnancy:

DHA is important for normal development and functioning of the brain and retina in the fetus and in infants. For this reason, it is thought that pregnant or nursing mothers may benefit from supplementation. DHA is also often added to formula for premature infants and some regular infant formulas and foods. In a recently reported Australian study, pregnant women were given 800 mg of DHA and 100 mg of EPA daily (from 1500 mg of fish oil in capsules) until birth. Compared to women given placebo (vegetable oil capsules), there was no statistically significant increase in cognitive or language development in offspring during early childhood. Somewhat fewer of the treated women had postpartum depression (9.67%) than those who received placebo (11.19%), but this was not statistically significant. However, there was a significant decrease in very premature births (1.09% in the treated group vs. 2.25% in the placebo group) as well as fewer low birth weight infants and fewer admissions to neonatal intensive care units. There were also fewer fetal/infant deaths among those taking fish oil, although not by a statistically significant margin. At the same time, more of the treated women were induced or had cesarean sections because they were post term (Makrides, JAMA 2010). Babies born to women in the study were nearly 40% less likely to have egg allergies in their first year of life. They were also less likely to have eczema, although this association did not hold after the results were adjusted for factors such as maternal history of allergies (Palmer, BMJ 2012). A related editorial recommended that pregnant women should get 200 mg of DHA per day either from a supplement or low-mercury fish and that the benefit of higher intakes remains unclear (Oken, JAMA 2010). Infants born to women in Mexico given 400 mg DHA daily (from algal oil from Martek Biosciences) during pregnancy (starting at about 20 weeks) had a lower occurrence of colds during the first three month of life than those whose mothers received placebo treatment (37.6% vs. 44.6%, respectively) (Imhoff-Kunsch, Pediatrics 2011). However, median daily intake of DHA among pregnant women in Mexico is much lower than in the U.S. (80 mg vs. 100 to 200 mg, respectively), so the findings may not apply to groups already consuming higher amounts of DHA.

Alzheimer Disease:

Population studies suggest that consumption of DHA is associated with reduced incidence of Alzheimer disease and animal studies demonstrate that DHA intake reduces Alzheimer-like brain disease. However, a recent study showed that supplementation with DHA from algae did not slow cognitive and functional decline in individuals with mild to moderate Alzheimer disease (Quinn, JAMA 2010). There was also no apparent reduction in the decline in brain volume. In the study, patients received 2 grams of DHA from algal oil daily or placebo for 18 months. All of the patients had previously consumed less than 200 mg of DHA per day and had not taken supplements with DHA or EPA. Among those given DHA in the study, plasma levels of DHA tripled and the amount of DHA in cerebrospinal fluid increased by 38%, with no significant change in those taking placebo. It should be noted that the study did not assess whether DHA could play a preventative role in Alzheimer disease, nor did it assess the effect of DHA in conjunction with EPA.

Age-related Cognitive Decline:

Studies have shown modest benefit with DHA for people with age-related cognitive decline (ARCD). Unlike Alzheimer disease, ARCD is not considered a disease and is a more gradual and, perhaps, normal consequence of aging. A 6-month study of people over age 65 with mild cognitive impairment showed that those receiving daily fish oil containing a large amount of DHA (1,550 mg) with EPA (400 mg) improved scores on verbal fluency (although not on any other memory or cognition test) compared to those in a control group receiving safflower oil (containing the omega-6 fatty acid, linoleic acid). An EPA/DHA combination (1,670 mg EPA with 160 mg DHA) did not affect any aspect of cognition or memory. However, both the EPA/DHA combination and, to a slightly greater extent, the DHA/EPA combination reduced depressive symptoms in these mildly cognitively impaired individuals (Sinn, Br J Nutr 2011). The researchers note that depression is a potential risk factor for progression to dementia, so the reduction of depressive symptoms may reduce the risk of dementia. In another study (Yurko-Mauro, Alzheimer's & Dementia 2010), participants with ARCD were given 900 mg per day of DHA from algal oil or placebo for 24 weeks. Those taking DHA showed significant improvements in verbal recognition memory, but no improvement in working memory or on executive function tests. Plasma DHA levels doubled in the group receiving the supplementation.

Memory-enhancement in Healthy Individuals:
In a small study of healthy, young adults, better working memory performance has been found to correlate with higher levels of DHA (as measured in red blood cell membranes), but not EPA (Narendran, PLoS One 2012). Working memory performance was tested by showing a series of letters and numbers and asking what appeared one, two, and three times prior. Those who had higher DHA levels performed better on the "3-back" question than those with lower levels. The subjects were then asked to take 2 grams of highly-concentrated fish oil (Lovaza, 930 mg EPA and 750 mg DHA) daily for six months and tested again: Scores improved on the "3-back" question and those who previously had the lowest DHA levels improved the most.

Strength Training in Older Women
A small study in Brazil looked at the potential benefit of fish oil on strength training in older individuals, based on the fact that omega-3's play a role in the plasma membrane and cell function of muscles (Rodacki, Am J Clin Nutr 2012). Forty-five mostly sedentary women in their mid-60s were given two doses a day of a gram of fish oil containing 180 mg of EPA and 120 mg of DHA. After twelve weeks of supervised lower-body resistance-training (3 times per week), the strength of those taking the fish oil had improved more than those who did not supplement. Functional capacity (e.g., the speed of rising from a chair) also increased more among those who took fish oil. There was no improvement in the strength of women who took fish oil without strength training, and taking fish oil for *two months before* training started did not confer added benefit.

Other Diseases:
Other proposed uses of fish oils with some support include asthma, Raynaud's phenomenon (abnormal sensitivity of hands and feet to cold), chronic fatigue syndrome, cystic fibrosis, and osteoporosis.

The balance of current evidence suggests that fish oil is not effective for migraine headaches, psoriasis, male infertility and enhancing immunity in people with HIV. Although some research has indicated that omega-3 fatty acid supplements might have anti-inflammatory effects that could benefit patients with multiple sclerosis (MS), a placebo-controlled study of 92 MS patients found no beneficial effect with daily fish oil (1,350 mg EPA and 850 mg DHA) for 2 years whether taken alone (for 6 months) or in combination with interferon (for 18 months). (Torkildsen, Arch Neurol 2012).

Pet Use:
Fish oil supplements are commonly given to pets to help maintain their coats and skin. [Reviews of other pet supplements by ConsumerLab.com include ALA and GLA, Joint Supplements and Multivitamins/Multiminerals.]

For information on dosages see What to Consider When Using.

Quality Concerns and What CL Tested for:

Because omega-3 fatty acids are obtained from natural sources, levels in supplements can vary, depending on the source and method of processing.

Contamination has also been an issue, because fish can accumulate toxins such as mercury, dioxins, and polychlorinated biphenyls (PCBs). Mercury can damage the nervous system -- particularly in a fetus. Dioxins and PCBs may be carcinogenic at low levels of exposure over time and may have other deleterious effects.

The freshness of the oil is also an important consideration because rancid fish oils can have an extremely unpleasant odor and taste. While you can sometimes determine this yourself if you take fish oil directly as a liquid, it can be masked by added flavors and not readily detected if you use a softgel and other encapsulated product. There may be safety considerations with rancid fish oils due to a variety of compounds produced, some of which are odorless, such as peroxides. A study commissioned by the government of Norway (where fish oil supplement use is extremely high) concluded there would be some health concern related to the regular consumption of oxidized (rancid) fish/marine oils, particularly in regards to the gastrointestinal tract, but there is not enough data to determine the risk (The Norwegian Scientific Committee for Food Safety, 2011). The study explained that the amount of spoilage and contamination in a supplement depends on the raw materials and processes of extraction, refining, concentration, encapsulation, storage and transportation. However, it saw no significant risk of contamination by microorganisms, proteins, lysophospholipids, cholesterol, and trans-fats.

Additionally, some capsules are enteric-coated and are expected to release the oil *after* the stomach to theoretically reduce fishy aftertaste or burp. If they release too soon they lose that potential benefit. If they release too late, the oil may not get absorbed.

Neither the FDA nor any other federal or state agency routinely tests fish or marine oil supplements for quality prior to sale. ConsumerLab.com, as part of its mission to independently evaluate products that affect health, wellness, and nutrition, purchased many dietary supplements sold in the U.S. claiming to contain EPA and/or DHA and tested them for their levels of omega-3 fatty acids (EPA, DHA and, if listed, ALA), mercury, lead, PCBs, and signs of decomposition. Enteric-coated capsules were tested to see if they properly released their ingredients. One product was additionally tested for dioxins at the request of its manufacturer. Among the products purchased and tested, the majority was for use by people and a few were for use by pets. Most of the supplements were softgel capsules or liquids.

For more information about the testing, see How Products Were Evaluated.

What CL Found:

Among the 35 products that ConsumerLab.com selected for review, only 24 passed quality testing, meeting requirements for freshness and purity, and containing their claimed amounts omega-3 fatty acids, and with any enteric-coatings performing properly. Eleven products failed to pass testing for the reasons noted below.

Contamination:
Two products failed to be Approved due to contamination with PCBs, which are man-made compounds with potential cancer-causing and toxic effects. There are over 200 known PCBs but, to-date, toxicity has only been established for a dozen of these, which are referred to as dioxin-like PCBs or dl-PCBs. *Xtendlife Omega 3/DHA Fish Oil Premium* exceeded the contamination limit for *dioxin-like* PCBs. It contained 4.77 picograms/gram, over the 3 picograms/gram limit established by the Global Organization for EPA and DHA (GOED). Ironically, this product claims a 'level of purity rarely achieved in other fish oils."

Nature's Way Fisol exceeded the limit for *total* PCBs (but not for dioxin-like PCBs). The threat is more vague with total PCBs, but, in the state of California, a supplement exceeding 90,000 picograms/gram is required to have a warning label. The *Nature's Way* product contained 122,403 picograms of total PCBs per gram. It did not carry a warning label. [**Update:** According to a communication from Nature's Way on 8/20/12, the fish oil in the *Fisol* product tested by ConsumerLab.com (which has an expiration date of 5/31/13) was produced in April 2011 and, under an industry settlement with the State of California, does not require a warning statement as it complied with then-current industry specifications (i.e., the GOED monograph). According to Nature's Way, all lots of *Fisol* to be produced after May 2012 must and will conform to the California limit (which is now part of the *new* GOED monograph). New lots have not yet been produced but will have expiration dates later than 3/31/14.]

The U.S. FDA has not set a limit for PCBs in supplements. It is unlikely that exposure from either product alone would cause toxicity, but it is preferable to avoid unnecessary exposure to toxins. However, bear in mind that, in comparison to a serving of most fish, even these products contain only a small amount of PCBs (see Contaminants in Fish vs. Supplements for more information about contamination).

Several products claimed to be "free of," "void of," or to have "no detectable" PCBs or other contaminants. Be aware that, using highly sensitive standard tests, all fish oil supplements reviewed by CL were found to contain at least trace levels of PCBs. Some also had trace levels of lead, but none exceeded conservative contamination limits for lead. None of the products were found to contain detectable levels of mercury [over 10 ppb (parts per billion)]. By comparison, mercury levels in fish generally range from 10 ppb to 1,000 ppb, depending on the fish.

There are several possible explanations for the relatively low level of contamination in the supplements: the use of species of fish that are lower on the food chain and, therefore, less likely to accumulate contaminants; the fact that most mercury is found in fish meat and not fish oil; and the use of purification processes that remove contaminants (See ConsumerTips, Forms of Fish Oil for information about purificiation processes). It is worth noting that liver oils may contain higher amounts of contaminants than other fish oils, which are generally made from oils from whole fish. However, the one cod liver oil product tested, *Carlson Norwegian Cod Liver Oil*, met the standards for purity.

Inaccurate Labeling:
Less ingredient than claimed:

- *Astamega-3 Omega-3 Krill Oil CardioSupport* contained only 74.7% of claimed EPA, 71.3% of claimed DHA, and 67.3% of claimed total omega-3s.
- *Petco Healthy Skin & Coat Omega-3 for Dogs* contained only 69.2% of its claimed DHA -- although it met its claims for EPA and total omega-3 and omega-9.
- *PharmaNutrients learn* contained only 80.3% of its listed amount of total omega-3s -- although it did contain listed amounts of EPA and DHA.
- *Xtendlife Omega3/DHA Fish Oil Premium* contained only 82.7% of claimed EPA and 86.2% of claimed total omega-3s (also failed for contamination, see below).

More ingredient than claimed:
The following products contained more of certain fatty acids than listed, although in each case the amounts involved are relatively small. These overages are not likely to pose a problem for a consumer, but they do suggest that better labeling and testing could be performed and, consequently, the quality of these products could not be Approved:

- Doctor's Best - Best DHA 500 from Calamari contained 265.2% of its claimed EPA.
- Natrol DHA 500 contained 267% of its claimed EPA
- Nordic Naturals Ultimate Omega (Dist. by Nordic Naturals, Inc.) contained 203% of its claimed oleic acid (omega-9)

In addition, although *Nordic Calamari Higher Potency Omega-3* (Dist. by Applied Nutrition) contained its listed amounts of omega-3s, its label claimed that a one softgel serving contained 1 mg of fat. That is impossible since each softgel contains over 1,000 mg of fat as oil. The manufacturer probably meant to write 1 gram of fat.

Enteric-coating that didn't work:
To reduce the likelihood of a fishy aftertaste or burp, some products have enteric coatings designed to release the oil in the intestine rather than the stomach. ConsumerLab.com tested these coatings in a simulated gastric environment. While several passed the test, *Simply Right regular strength all natural enteric fish oil* did not. The capsules released oil too early. (See more information at "What to Consider When Buying -- Enteric-coated Pills.")

Spoilage:
While spoilage does not necessarily indicate lower amounts of omega-3s, it indicates elevated levels of spoilage compounds that may cause burping and other gastrointestinal effects. One pet supplement, *1-800-PetMeds® Super Pure Omega 3 for Dogs & Cats*, was found to be spoiled. The test for spoilage results in a TOTOX value which, to be considered fresh, should not exceed a value of 26. The *PetMeds* product far exceeded this threshold with a TOTOX value of 75.7.

The tests for spoilage were conducted on newly opened products, maintained out of heat and moisture. However, be aware that spoilage may occur after products are opened and exposed to air (see Keeping It Fresh for storage tips).

Lemon and other citrus flavorings, which are common in marine oil supplements, can interfere with spoilage testing, giving a falsely high TOTOX value. Consequently, ConsumerLab.com was not able to determine spoilage in such products, as indicated with "N/A" (not applicable) in the "Freshness" column of the results table below).

"Fishy" labeling: To distinguish themselves, some products sport terms which, in actuality, are meaningless and misleading:

- "Pharmaceutical grade" -- Although some products claim to be "pharmaceutical grade" this term means nothing, as the FDA has not defined what would constitute a pharmaceutical grade fish oil product.
- "Tested in FDA approved laboratories" -- The FDA does not approve analytical laboratories so these claims are not correct, although laboratories may be FDA registered and inspected.
- "Krill Oil" -- Be aware that term "krill oil" in the name of a product does not necessarily means it's all krill oil. We found this to be the case with *Source Natural Arctic Pure Krill Oil* (which is why we listed it among the "Fish/Krill Oil" products and not with "Krill Oil" products in the results table below). If you look carefully at its label, the Other Ingredients section (which is in order of amount) shows "fish oil" first on the list. How can Source Natural do this? "Arctic Pure Krill Oil" is actually a trade name for a blend of fish oil and krill oil made by Azantis, Inc. In fact, even the astaxanthin (naturally found in real krill oil, giving it its red color) has been added from an algal source, although this is not disclosed on the label. We first pointed out this marketing maneuver in 2010 when we saw it with a "krill oil" supplement from Walgreens. Perhaps these fish/krill blends should really be called "krish" oil or, more appropriately, "frill" oil?
- "Daily value for EPA and DHA" -- In the Supplement Facts panels of some products are claims that they provide a specific percentage of the DV (Daily Value) for EPA and DHA. DVs are developed by the USDA and FDA and relate to the recommended daily allowance of a required nutrient. However, no DV has been established for EPA and DHA. *Natrol DHA 500 Super Strength, for example*, claims that its listed 540 mg of EPA and DHA provide 338% of this imaginary DV. The Natrol product also claims to contain "animal derivatives in trace amounts," but this is obviously incorrect based on the substantial amount of fish oil which it contains. This language may have been intended to refer to the softgel capsule, which is made from gelatin.

Range of EPA + DHA Concentrations and Pill Sizes
The concentrations of EPA and DHA in the pills and liquids can vary by as much as tenfold -- from as little as 8% to over 80% of the fish oil content. Concentration depends on the source of the omega-3s, how the oil is processed, and the amounts of other ingredients included in the supplement. If you are trying to get as much EPA or DHA from the smallest serving size (i.e., fewer or smaller pills or smaller liquid amounts), look for supplements without other ingredients and with higher concentrations of EPA and DHA. A more concentrated product will generally allow you to ingest less total fish oil -- although this may mean saving less than a gram (9 calories) of oil per daily serving. Higher concentrations are not necessarily better for you. You can get the same amount of EPA and DHA from both high and low concentration products as long as you adjust the dose accordingly.

To help you compare the concentrations of products, refer to the bottom of the second column in the results table below, which provides the relative concentration of EPA and DHA in the listed amount of fish, or other, oil claimed in each product. (If a product did not list the total amount of oil, we calculated the concentration based on the amount of EPA and DHA as a percentage of the content weight.)

Relative Concentrations of EPA + DHA in Tested Products:
- Extremely high: 80% to 90% (Note: This is the concentration of the prescription medication Lovaza.)
- Very high: 65% to 79%
- High: 45% to 64%
- Moderate: 24% to 44%
- Low: 17% to 23%
- Very low: 8% to 16%

Most of the supplements were softgels and ranged in length from just under one-half inch to over one inch in length. These are fairly large sizes compared to capsules of other types of supplements. If you have trouble swallowing large softgels, the second column of the results table also includes descriptions of the pill size, type of pill, and amount of EPA and DHA per pill or unit. The tested softgels are grouped by length as follows:
Softgel Sizes by Length: (Oblong shape unless noted otherwise)
- Very large: over 25.4 mm (> 1 inch)
- Large: up to 25.4 mm (1 inch)
- Medium/Large: up to 19 mm (3/4 inch)
- Medium: up to 12.7 mm (1/2 inch)

The Bottom Line: Finding Good Quality at Low Cost:

To help you compare the cost of products and determine those that offer the best value, the last column of the table below shows the cost to obtain 100 mg of EPA and/or DHA from each product based on the price we paid. After all, it's not how much "oil" that matters, but how much actual EPA and/or DHA you get. Keep in mind that prices may vary and your cost per serving will typically be several times the amount shown in the table depending on how large a dose of EPA and/or DHA you take -- which can range from as little as about 25 mg to more than 5,000 mg per day (see Dosage information).

The least expensive way to get good-quality EPA and DHA is from **fish oil in softgels**. The cost per 100 mg of these omega-3's can be as little as 1 cent from brands such as *Kirkland Signature Natural Omega-3 Fish Oil 1000 mg*, *Swanson EFA's Super EPA*, and *Vitacost Mega EFA Omega-3 EPA & DHA*. **Fish oil liquids**, e.g. from bottles, can also be relatively inexpensive (as little as 3 cents per 100 mg from *Vitamin Shoppe Omega 3 Fish Oil*). A cod liver oil (*Carlson Norwegian Cod Liver Oil*) was close in price (4 cent/100 mg).

Enteric-coated softgels, intended to deliver their contents after the stomach to help avoid "fish burp," cost a bit more than regular softgels, but we found one that met quality standards and costs only 4 cents per 100 mg (*GNC Triple Strength Fish Oil + Vitamin D-3*). However, due to the relatively high dose of EPA and DHA (900 mg) in this product, its pills cost 37 cents each. If you want a lower dose enteric-coated softgel and one without added vitamins, *ProNutrients Omega3* provides 300 mg per pill and costs 28 cents per pill (5 cents per 100 mg).

Other marine sources of EPA and DHA of tend to be more expensive. Here they are in order, based on increasing cost to get 100 mg of EPA and DHA from quality-approved products:

- **Calamari oil** -- Lowest cost was *Doctor's Best - Best DHA 500 from Calamari* (5 cents/100 mg), but be aware that this product was not Approved because it provides more EPA than listed (133 mg instead of 50 mg).
- **Algal oil** -- Lowest cost was *Ovega-3* (7 cents/100 mg).
- **Krill oil** (by far, the most expensive source) -- Lowest cost was *Swanson EFA's 100% Pure Krill Oil* (19 cents/100 mg). Some krill oils cost 50 cents/100 mg and the one krill oil that failed testing (*Astamega-3 Omega-3 Krill Oil CardioSupport*) actually cost the most (70 cents/100 mg).

Prenatal supplements often come with a separate multivitamin, as did the two that we tested (*brain strong* and *One A Day Women's Prenatal with DHA*). Due to the added vitamin pill they are a more expensive source of EPA and DHA than simple fish oil (11 to 12 cents per 100 mg). (Note: Our testing did not include analysis of the separate vitamin pill. You can find ConsumerLab.com's tests of prenatal vitamins in the Multivitamin Review).

Children's supplements with fish oil, such as chewables or gummies, tend to sell at premium prices, (about 30 cents/100 mg), on account of their special formulations. However, *OmegaBrite Kidz* (Orange Cream or Tutti Frutti) cost only 5 cents per 100 mg. It's highly concentrated, so just a quarter teaspoon (31 cents worth) provides 587 mg of EPA and DHA. Another children's supplement, *PharmaNutrients learn*, cost only 6 cents per 100 mg, but it failed to be approved because it fell short on its listed amount of total omega-3's, although it did contain the claimed EPA and DHA.

A lower-cost alternative is to offer children one of the low-cost Approved fish oil liquids in a spoon, such as the *Vitamin Shoppe Omega 3 Fish Oil* supplement noted earlier. The taste of good fish oil is typically mild and just a quarter teaspoonful of the *Vitamin Shoppe* liquid, for example, contains 325 mg of EPA and DHA, costing only about 10 cents (that's just 3 cents per 100 mg).

Pet supplements, unfortunately, require extra care when buying due to a higher risk of choosing a product of poor quality. Out of the three pet supplements we selected for testing, the only one to pass was *Omega-Caps for Cats and Small Dogs*, which happened to be the most expensive (15 cents/100 mg).

Test Results by Product:

Listed alphabetically below are the test results for 73 supplements containing omega-3 fatty acids. Thirty-five (35) of these were selected by ConsumerLab.com for review. Thirty-eight (38) others (each indicated with an asterisk) were tested at the request of their manufacturers/distributors through CL's Voluntary Certification Program and are included for having passed testing. Also listed are two products similar to others which passed testing but are sold under different brand names.

The full list of ingredients is available for each product by clicking on the word "Ingredients" in the first column. All "Approved" products met their label claims for omega-3s, quality standards regarding mercury, lead and PCBs, were not spoiled, and, if labeled as "enteric coated," passed the relevant disintegration testing. Two voluntarily tested products also passed optional dioxin testing (indicated with a "D" in the third to last column) undertaken at the request of the manufacturer/distributor as an added test of quality.
Also see ConsumerLab.com's tests of raw materials used in omega-3 supplements.

RESULTS OF CONSUMERLAB.COM TESTING OF OMEGA-3 MARINE OIL SUPPLEMENTS
Click on ▲ for additional information on the product
Click on **$ Price Check** beneath a product name to find a vendor that sells it.
To find retailers that sell some of the listed products click here.

Product Name and Suggested Daily Serving Size on Label Click on "Ingredients" for Full Listing	**Labeled Amount of EPA, DHA, and/or Other Omega Fatty Acids *Per Pill or Unit*[1]** **Relative Size of Pill** **Relative Concentration of EPA + DHA[2]**	**-- TEST RESULTS --** (See How Products Were Evaluated)				
		OVERALL RESULTS: APPROVED (Passed) or *NOT* APPROVED (Failed)	**Contained Labeled Amount of EPA, DHA, and/or other Omega Fatty Acids *Per Pill or Unit***	**Purity** Did Not Exceed Contamination Limits for Mercury and PCBs **D** = Also Tested for Dioxins: Safe Level Found	**Freshness[3]**	**Cost for 100 mg of EPA + DHA[4]** **Cost for Daily Suggested Serving on Label** **Additional Notable Ingredients/Features[5]** **Price Paid**
Fish Oil Softgel Products:						
21st Century® Omega-3 Fish Oil 1000 mg (Up to 3 softgels daily)* Dist. by 21st Century HealthCare, Inc. Ingredients **$ Price Check**	**Total Omega-3s:** 300 mg Very large softgel Moderate concentration	**APPROVED**	✓Total Omega-3s Found: EPA: 176 mg DHA:89 mg	✓	✓	$0.02 $0.04 to $0.13 Molecularly distilled $12.79/300 softgels
Ariix™ omega-Q™ (2 softgels daily)* Dist. by Ariix Ingredients	**EPA:** 295 mg **DHA:** 235 mg Large Softgel High concentration	**APPROVED** **(Also approved for CoQ10)**	✓	✓	✓	$0.21 $2.19 CoQ10 $61.36/56 softgels
Carlson® Super Omega-3 Gems™ Fish Oil Concentrate (1 to 5 softgels daily)* Dist. by Carlson Division of J.R. Carlson Laboratories, Inc. Ingredients **$ Price Check**	**EPA:** 300 mg **DHA:** 200 mg **Total Omega-3s:** 600 mg Very large softgel High concentration	**APPROVED**	✓	✓	✓[a]	$0.03 $0.13 to $0.63 *Gluten free* $45.49/360 softgels
CVS® Pharmacy Natural Fish Oil Concentrate 1,200 mg (3 softgels daily)* Dist. by Carlson Division of J.R. Carlson Laboratories, Inc. Ingredients	**Total Omega-3s:** 360 mg Very large softgel Moderate concentration	**APPROVED**	✓ Total Omega-3s Found: EPA: 231 mg DHA: 88 mg	✓	✓[a]	$0.03 $0.29 *Gluten free* $5.89/60 softgels
Douglas Labs Quell Fish Oil EPA/DHA Plus D (1 softgel daily)* Dist. by Douglas Laboratories Ingredients **$ Price Check**	**EPA:** 600 mg **DHA:** 400 mg **Total Omega-3s:** 1250 mg Large softgel High Concentration	**APPROVED**	✓	✓	✓	$0.10 $0.98 Supercritical CO2 triglyceride concentrate Vitamin D3 *No wheat gluten* $29.50/30 softgels
Finest Natural® (Walgreens) Fish Oil (2 softgels, twice daily)* Dist. by Walgreen Co. Ingredients	**Total Omega-3s:** 360 mg Very large softgel Moderate concentration	**APPROVED**	✓Total Omega-3s Found: EPA: 217 mg DHA: 102 mg	✓	✓[a]	$0.03 $0.36 *Gluten free* $8.99/100 softgels
Garden of Life® Oceans 3™ (2 softgels, up to three times daily)* Dist. by Garden of Life, Inc. Ingredients **$ Price Check**	**EPA:** 337.5 mg **DHA:** 225 mg **Total Omega-3s:** 638 mg Very large softgel High concentration	**APPROVED**	✓	✓	✓[a]	$0.06 $0.72 to $2.16 Molecularly distilled Astaxanthin and fucoxanthin *Gluten free* $21.60/60 softgels *Refrigerate after opening*

GNC Fish Oil 1000 (1 to 2 softgels, three times daily)* Dist. by General Nutrition Corporation Ingredients $ Price Check	**Total Omega-3s:** 300 mg Very large softgel Moderate concentration[6]	**APPROVED**	✓Total Omega-3s Found: EPA: 164 mg DHA: 102 mg	✓	N/A[a] [8]	$0.04 $0.33 to 0.66 Purified, deodorized *Gluten free* $19.98/softgels
GNC Triple Strength Fish Oil + Phytosterols (2 softgels daily)* Dist. by General Nutrition Corporation Ingredients	**EPA:** 323.5 mg **DHA:** 127 mg Very large softgel Moderate concentration[6]	**APPROVED** **Also APPROVED for Phytosterols**	✓	✓	✓[a]	$0.10 $0.90 Purified Phytosterols *Gluten free* $26.99/60 softgels
GNC Triple Strength Omega Complex (3 softgels daily)* Dist. by General Nutrition Corporation Ingredients $ Price Check	**EPA:** 215.7 mg **DHA:** 84.3 mg **ALA:** 125 mg **GLA:** 60 mg Very large softgel Moderate concentration[6]	**APPROVED**	✓	✓	✓[a]	$0.19 $1.67 Purified, flavored to control or reduce fishy burps *Gluten free* $49.98/90 softgels
Jamieson™ Omega-3 Select (3 softgels daily) Dist. by Jamieson Laboratories Ingredients 🍁	**EPA:** 300 mg **DHA:** 200 mg **Total Omega-3s:** 500 mg Very large softgel High concentration	**APPROVED**	✓	✓	✓	$0.03 $0.39 Molecularly distilled, pharmaceutically tested *Gluten free* $25.99/200 softgels
Jarrow Formulas® PhosphOmega® (1 softgel, once or twice daily)* Dist. by Jarrow Formulas® Ingredients $ Price Check	**EPA:** 84 mg **DHA:** 111 mg **Total Omega-3s:** 223 mg Large softgel High concentration	**APPROVED**	✓	✓[D]	✓	$0.17 $0.34 to $0.67 Astaxanthin *Gluten free* $20.19/60 softgels
Julian Whitaker, M.D. O-3 Essentials® (1 softgel, twice daily)* Dist. by Healthy Directions, LLC Ingredients	**EPA:** 270 mg **DHA:** 180 mg Very large softgel High concentration	**APPROVED**	✓	✓	N/A[8]	$0.04 $0.40 $11.99/60 softgels
Kirkland (Costco) Signature™ Natural Omega-3 Fish Oil 1000 mg (1 softgel, three times daily) Dist. by Costco Wholesale Corporation Ingredients	**Total Omega-3s:** 300 mg Very large softgel Moderate concentration	**APPROVED**	✓Total Omega-3s Found: EPA: 198 mg DHA: 82 mg	✓	✓	$0.01 ***Lowest cost from fish oil*** $0.07 Molecularly distilled, natural triglycerides *Gluten free* $8.89/400 softgels
Life Extension® Super Omega-3 EPA/DHA with Sesame Lignans & Olive Fruit Extract (2 softgels, twice daily)* Dist. by Quality Supplements and Vitamins, Inc. Ingredients $ Price Check	**EPA:** 350 mg **DHA:** 250 mg Very large softgel High concentration	**APPROVED**	✓	✓	✓	$0.03 $0.80 Molecularly distilled Sesame lignans, olive fruit extract $24.00/120 softgels
Metagenics® EPA-DHA 720™ (2 softgels, up to 3 times daily) Dist. by Metagenics, Inc. Ingredients $ Price Check	**EPA:** 430 mg **DHA:** 290 mg **Total Omega-3s:** 760 mg Very large softgel High concentration	**APPROVED**	✓	✓	N/A[8]	$0.05 $0.70 to $2.10 *Gluten free* $41.95/120 softgels

Minami MorEPA Platinum (1 softgel daily)* Dist. by Garden of Life LLC Ingredients	**EPA:** 756 mg **DHA:** 228 mg **Total Omega-3s:** 1100 mg Large softgel Very High concentration	**APPROVED**	✓	✓	N/A[8]	$0.07 $0.66 Dual supercritical CO_2 extraction Vitamin D $19.66/30 softgels
Natrol® DHA 500 Super Strength (1 softgel daily) Dist. by Natrol, Inc. Ingredients	**EPA:** 40 mg **DHA:** 500 mg Very large softgel High concentration	**NOT APPROVED**	Found 267% of claimed EPA	✓	N/A[8]	$0.05 $0.29 Molecularly distilled *Gluten free* $8.71/30 softgels
Natural Factors® RxOmega-3 Factors™ Pharmaceutical Grade EPA 400 mg/DHA 200 mg (1 softgel, one to three times daily) Mfd. by Natural Factors, Canada Ingredients $ Price Check	**EPA:** 400 mg **DHA:** 200 mg **Total Omega-3s:** 630 mg Very large softgel High concentration	**APPROVED**	✓	✓	✓	$0.02 $0.27 to $0.81 Highly purified *Gluten free* $16.17/120 softgels
Nature Made® One Per Day Fish Oil (1 to 2 softgels daily)* Dist. by Nature Made Nutritional Products Ingredients $ Price Check	**EPA:** 360 mg **DHA:** 300 mg **Total Omega-3s:** 720 mg Very large softgel Moderate concentration	**APPROVED**	✓	✓	✓	$0.02 $0.16 to $0.32 Molecularly distilled *Gluten free* $18.99/120 softgels
Nature's Bounty® Fish Oil 1200 mg (1 softgel, three times daily)* Dist. by Nature's Bounty, Inc. Ingredients $ Price Check	**Total Omega-3s:** 360 mg Very large softgel Moderate concentration	**APPROVED**	✓Total Omega-3s Found: EPA: 229 mg DHA: 86 mg	✓	✓	$0.02 $0.15 Purified *Gluten free* $9.00/180 softgels
Nordic Naturals® Ultimate™ Omega (2 softgels daily) Dist. by Nordic Naturals, Inc. Ingredients	**EPA:** 325 mg **DHA:** 225 mg **Total Omega-3s:** 640 mg **Oleic Acid (omega-9):** 28 mg Large softgel High concentration	**NOT APPROVED**	✓EPA, DHA, and Total Omega-3s Found 203% of claimed Omega-9s	✓	N/A[8]	$0.06 $0.66 Molecularly distilled *Gluten free* $59.46/180 softgels
Nutrilite® OceanEssentials® heart health omega-3 supplement (3 softgels daily) Dist. by Amway Corp. Ingredients	**EPA:** 400 mg **DHA:** 200 mg Very large softgel High concentration[6]	**APPROVED**	✓	✓	✓	$0.08 $1.41 $42.35/90 softgels
OmegaBrite (3 softgels daily)* Dist. by Pure World Solutions, Ltd. Ingredients	**EPA:** 350 mg **DHA:**50 mg **Total Omega-3s:** 450 mg **Total Omega-6s:** 20 mg **Total Other Fatty Acids:** 28.3 mg Large softgel Very High concentration	**APPROVED**	✓	✓[D]	✓	$0.10 $1.15 *Gluten free* $22.99/60 softgels
Omega Smart (ReNew Life) Ultimate Fish Oils Super Critical™ (1 to 2 softgels daily)* Dist. by ReNew Life Formulas® Ingredients $ Price Check	**EPA:** 780 mg **DHA:** 120 mg **Total Omega-3s:** 1,025 mg **Total Omega-6s:** 56 mg **Total Omega-9s:** 12 mg Very large softgel Very high concentration	**APPROVED**	✓	✓	N/A[a][8]	$0.09 $0.83 to $1.67 Supercritical CO_2 extraction *Gluten free* $24.99/30 softgels

Swanson® EFA's Super EPA (1 softgel daily) Dist. by Swanson Health Products Ingredients $ Price Check	**EPA:** 300 mg **DHA:** 200 mg **Total Omega-3s:** 550 mg Very large softgel High concentration	**APPROVED**	✓	✓	✓[a][8]	$0.01 ***Lowest cost from fish oil*** $0.06 $6.49/100 softgels
USANA Optimizers™ BiOmega™ (2 softgels daily)* Dist. by USANA Health Sciences, Inc. Ingredients	**EPA:** 290 mg **DHA:** 235 mg **Total Omega-3s:** 600 mg Large softgel High concentration	**APPROVED**	✓	✓	N/A[a][8]	$0.08 $0.80 $22.42/56 softgels
Vitacost Mega EFA® Omega-3 EPA & DHA (2 softgels daily)* Dist. by Vitacost® Ingredients	**EPA:** 400 mg **DHA:** 200 mg Very large softgel High concentration	**APPROVED**	✓	✓	✓	$0.01 ***Lowest cost from fish oil*** $0.16 Molecularly distilled *Gluten free* $4.83/60 softgels
Vitamin World® Omega-3 Fish Oil (1 softgel, three times daily)* Mfd. by Vitamin World, Inc. Ingredients	**Total Omega-3s:** 300 mg Very large softgel Moderate concentration	**APPROVED**	✓Total Omega-3s Found: EPA: 181 mg DHA: 74 mg	✓	✓	$0.02 $0.12 Molecularly distilled *Gluten free* $9.99/250 softgels
Whole Foods™ Molecularly Distilled Omega-3 From Cold Water Fish Oil (1 softgel daily) Dist. by Whole Foods Market Ingredients	**EPA:** 180 mg **DHA:** 120 mg Very large softgel Moderate concentration	**APPROVED**	✓	✓	N/A[8]	$0.02 $0.07 Molecularly distilled $12.99/180 softgels
Xtendlife™ Omega 3/DHA Fish Oil Premium (2 softgels, once or twice daily) Dist. by Xtend-Life® Natural Products (Intl) Ltd. Ingredients	**EPA:** 130 mg **DHA:** 300 mg **Total Omega-3s:** 500 mg **Total Omega-6s:** 60 mg **Total Omega-9s:** 180 mg Very large softgel Moderate concentration	**NOT APPROVED**	✓DHA, Total Omega-6s, and Total Omega-9s Found only 82.7% of claimed EPA and 86.2% of claimed total omega-3s	Exceeded limit for dioxin-like PCBs (but not for total PCBs)	✓	$0.07 $0.32 to $1.26 Blend of whiting oil and molecularly distilled tuna Lycopene, astaxanthin *Gluten free* $18.95/60 softgels
Similar To Approved Fish Oil Softgel Products: **						
Puritan's Pride® Premium Omega-3 Fish Oil 1000 mg (1 softgel, three times daily) Mfd. by Puritan's Pride, Inc. Ingredients	Similar to: Vitamin World® Omega-3 Fish Oil					
Sundown Naturals® Fish Oil 1000 mg (1 softgel, three times daily) Mfd. by Rexall Sundown, Inc. Ingredients $ Price Check	Similar to: Vitamin World® Omega-3 Fish Oil					
Enteric Coated Fish Oil Products:						
GNC TriFlex™ Complete Vitapak® TriFlex™ Fast Acting (1 packet daily [contains 1 enteric coated fish oil softgel])* Dist. by General Nutrition Corporation Ingredients $ Price Check	**EPA:** 647 mg **DHA:** 243 mg Very large softgel Very high concentration[6]	**APPROVED**	✓	✓	✓[a]	$0.19 $1.67 Coated to control or reduce fish burps Includes pills with vitamin C, glucosamine, chondroitin, MSM, herbal extracts *Gluten free* $49.99/box [containing 30 packets]

GNC Triple Strength Fish Oil + Resveratrol (1 enteric coated softgel daily)* Dist. by General Nutrition Corporation Ingredients $ Price Check	**EPA:** 647 mg **DHA:** 253 mg Very large softgel High concentration[6]	**APPROVED** **Also APPROVED for Resveratrol**	✓	✓	✓[a]	$0.07 $0.60 Purified, coated to control or reduce fish burps Resveratrol *Gluten free* $35.99/60 enteric coated softgels
GNC Triple Strength Fish Oil + Vitamin D-3 (1 enteric coated softgel daily)* Dist. by General Nutrition Corporation Ingredients $ Price Check	**EPA:** 647 mg **DHA:** 253 mg Very large softgel High concentration[6]	**APPROVED** **Also APPROVED for Vitamin D**	✓	✓	✓[a]	$0.04 ***Lowest cost with enteric coating*** $0.37 Purified, coated to control or reduce fish burps Vitamin D *Gluten free* $22.49/60 enteric coated softgels
GNC Triple Strength Fish Oil Sport (2 enteric coated softgels daily)* Dist. by General Nutrition Corporation Ingredients $ Price Check	**EPA:** 323.5 mg **DHA:** 127 mg Very large softgel Moderate concentration[6]	**APPROVED**	✓	✓	✓[a]	$0.07 $0.60 Purified, coated to control or reduce fish burps L-Glutamine *Gluten free* $35.99/120 enteric coated softgels
Nature's Way® Fisol™ (1 enteric coated softgel, up to three times daily) Dist. by Nature's Way Products, Inc. Ingredients	**EPA:** 150 mg **DHA:** 100 mg Medium/large softgel High concentration	**NOT APPROVED**	✓	Exceeded limit for total PCBs (but not dioxin-like PCBs)	✓	$0.05 $0.12 to $0.37 Molecularly distilled *Gluten free* $22.49/180 enteric coated softgels
ProNutrients™ Omega3 (2 enteric coated softgels daily) Dist. by Pfizer Ingredients $ Price Check	**EPA:** 200 mg **DHA:** 100 mg **Total Omega-3s:** 332.5 mg Medium softgel High concentration[6]	**APPROVED**	✓	✓	✓[a]	$0.05 $0.28 Highly purified, coated to control fishy burps $13.99/100 enteric coated softgels
Simply Right™ (Sam's Club) Regular Strength All Natural Enteric Fish Oil (1 enteric coated softgel, one to three times daily) Dist. by Sam's West, Inc. Ingredients	**EPA:** 162 mg **DHA:** 108 mg **Total Omega-3s:** 300 mg Medium/large softgel High concentration	**NOT APPROVED** Enteric coating failed (Released too soon in gastric-like fluid)	✓	✓	✓	$0.01 $0.03 to $0.09 Purified, enteric coated reduces fish aftertaste *Gluten free* $9.98/350 enteric coated softgels/span>
VitalOils1000™ (1 enteric coated softgel daily)* Dist. by VitalRemedyMD, Inc. Ingredients	**EPA:** 250 mg **DHA:** 750 mg **Total Omega-3s:** 1,020 mg Very large softgel Very high concentration[6]	**APPROVED**	✓	✓	✓[a]	$0.10 $1.00 Refined with supercritical fluid technology *Gluten free* $29.95/30 enteric coated softgels
Liquid and Gel Fish Oil Products:						

Barlean's Organic Oils Fresh Catch® Fish Oil (1 teaspoon daily) Dist. by Barlean's Organic Oils Ingredients **$ Price Check**	**EPA:** 850 mg **DHA:** 550 mg **Total Omega-3s:** 1,740 mg **Omega-6:** 140 mg **Omega-9:** 510 mg Teaspoon Moderate concentration[6]	**APPROVED**	✓	✓	✓	$0.06 $0.82 Ultra-purified $38.32/8 fluid ounce bottle *Refrigerate after opening*
Coromega® Omega-3 squeeze (1 squeeze packet daily) Mfd. by The Coromega Co., Inc. Ingredients **$ Price Check**	**EPA:** 350 mg **DHA:** 230 mg **Total Omega-3s:** 650 mg Squeeze packet Moderate concentration	**APPROVED**	✓	✓	N/A[a][8]	$0.07 $0.39 Molecularly distilled *Gluten free* $34.79/90 squeeze packs
GNC Triple Strength Fish Oil (1 teaspoon daily)* Dist. by General Nutrition Corporation Ingredients **$ Price Check**	**EPA:** 582 mg **DHA:** 388 mg **Total Omega-3s:** 1,165 mg Teaspoon High concentration[6]	**APPROVED**	✓	✓	N/A[8]	$0.08 $0.74 Purified $34.99/8 fluid ounce bottle *Refrigerate after opening*
Vitamin Shoppe® Omega 3 Fish Oil 800 EPA/500 DHA (1 teaspoon daily)* Dist. by The Vitamin Shoppe® Ingredients **$ Price Check**	**EPA:** 800 mg **DHA:** 500 mg **Total Omega-3s:** 1,500 mg Teaspoon Moderate concentration[6]	**APPROVED**	✓	✓	N/A[8]	$0.03 ***Lowest cost from liquid*** $0.33 Molecularly distilled *Gluten free* $9.99/5 fluid ounce bottle *Refrigerate after opening*
Krill Oil Products:						
Astamega-3™ Omega-3 Krill Oil CardioSupport (1 to 2 softgels daily) Dist. by PatentHEALTH, LLC Ingredients	**EPA:** 60 mg **DHA:** 30 mg **Total Omega-3s:** 100 mg Medium/large softgel Moderate concentration	**NOT APPROVED**	Found only 74.7% of claimed EPA, 71.3% of claimed DHA, and 67.3% of claimed total omega-3s	✓	✓	$0.70 $0.63 to $1.26 Astaxanthin 500 mcg/softgel $18.99/30 softgels
Dr. Mercola® Krill Oil (2 liquid filled capsules daily) Dist. by Mercola Health Resources, LLC Ingredients	**EPA:** 45 mg **DHA:** 25 mg **Total Omega-6s:** 10 mg Large softgel Very low concentration	**APPROVED**	✓	✓	✓	$0.50 $0.70 Astaxanthin 0.3 mg/capsule $62.97/180 liquid filled capsules
Everest Nutrition Krill Oil Caplique Capsules (2 to 4 capsules daily)* Dist. by Everest Nutrition Corporation Ingredients	**EPA:** 87.5 mg **DHA:** 47.5 mg **Total Omega-3s:** 150 mg Large capsule Low concentration	**APPROVED**	✓	✓[D]	✓	$0.37 $1.00 - $2.00 Astaxanthin 0.8 mg/capsule $29.97/60 capsules
GNC Ultra Omega Krill Oil (1 enteric coated softgel daily)* Dist. by General Nutrition Corporation Ingredients **$ Price Check**	**Total Omega-3s:** not less than 75 mg Medium/large softgel Low concentration	**APPROVED**	✓ Total Omega-3s Found: EPA: 71 mg DHA: 44 mg	✓	✓	$0.37 $0.42 Coated to reduce fishy burps *Gluten free* $25.19/60 enteric coated softgels
Jarrow Formulas® Krill Oil (2 softgels daily) Dist. by Jarrow Formulas® Ingredients **$ Price Check**	**EPA:** 57.5 mg **DHA:** 33 mg **Total Omega-3s:** 115 mg Medium/large softgel Very low concentration[6]	**APPROVED**	✓	✓	✓	$0.34 $0.62 Astaxanthin 25 mcg/softgel *Gluten free* 18.45/60 softgels

NOW® Neptune Krill Oil (2 softgels daily) Mfd. by NOW Foods Ingredients **$ Price Check**	**EPA:** 70 to 80 mg **DHA:** 40 to 50 mg **Total Omega-3s:** 115 to 150 mg **Total Omega-6s:** 5 to 10 mg **Total Omega-9s:** 30 to 40 mg Medium softgel Low concentration	**APPROVED**	✓	✓	✓	$0.30[7] $0.65 Astaxanthin 500 to 750 mg/softgel *Gluten free* $38.99/120 softgels
Schiff® MegaRed® 100% Pure Omega-3 Krill Oil 300 mg (1 softgel daily) Dist. by Schiff Nutrition Group, Inc. Ingredients **$ Price Check**	**EPA:** 50 mg **DHA:** 24 mg **Total Omega-3s:** 90 mg Medium/large softgel Moderate concentration	**APPROVED**	✓	✓	✓	$0.54 $0.40 *Gluten free* $23.84/60 softgels
Swanson® EFA's 100% Pure Krill Oil (1 softgel, once or twice daily)* Dist. by Swanson Health Products Ingredients **$ Price Check**	**EPA:** 60 mg **DHA:** 28 mg **Total Omega-3s:** 110 mg Medium/large softgel Low concentration	**APPROVED**	✓	✓	N/A[8]	$0.19 ***Lowest cost from krill oil*** $0.17 to $0.33 Astaxanthin 40 mcg/softgel $9.99/60 softgels
Fish/Krill Oil Blends:						
GNC Triple Strength Fish Oil + Krill (2 enteric coated softgels daily)* Dist. by General Nutrition Corporation Ingredients **$ Price Check**	**EPA:** 323.5 mg **DHA:** 127 mg Large softgel High concentration[6]	**APPROVED**	✓	✓	✓[a]	$0.09 $0.84 Purified, coated to control or reduce fish burps *Gluten free* $25.19/60 enteric coated softgels
Omega Factor 3 (1 softgel daily) Dist. by Factor Nutrition Labs, LLC Ingredients **$ Price Check**	**EPA:** 405 mg **DHA:** 240 mg **Total Omega-3s:** 645 mg Very large softgel High concentration	**APPROVED**	✓	✓	✓[a]	$0.06 $0.37 *Gluten free* $21.99/60 softgels
Source Naturals® Arctic Pure™ Krill Oil (1 to 2 softgels daily) Dist. by Source Naturals, Inc. Ingredients **$ Price Check**	**EPA:** 75 mg **DHA:** 45 mg **Total Omega-3s:** 150 mg Medium/large softgel Moderate concentration	**APPROVED**	✓	✓	✓[a]	$0.26 $0.31 to $0.62 Astaxanthin 750 mcg/softgel $36.91/120 softgels
Calamari Products:						
Doctor's Best® Best DHA 500 from Calamari (1 to 3 softgels daily) Dist. by Doctor's Best, Inc. Ingredients	**EPA:** 50 mg **DHA:** 500 mg **Total Omega-3s:** 550 mg Very large softgel High concentration[6]	**NOT APPROVED**	✓DHA and Total Omega-3s Found 265.2% of claimed EPA	✓	N/A[8]	$0.05 ***Lowest cost from calamari oil*** $0.26 to 0.78 Molecularly distilled $46.78/180 softgels
Dr. Sinatra Omega Q Plus (2-4 softgels daily)* Dist. by Healthy Directions Ingredients	**EPA:** 75 mg **DHA:** 175 mg Large softgel Moderate concentration	**APPROVED** **(Also approved for CoQ10)**	✓	✓	N/A[8]	$0.13 $0.90-$1.80 Coenzyme Q10, L-carnitine, vitamin B6, vitamin B12, folic acid *Gluten free* $80.97/180 softgels
LaneLabs EcoOmega® (3 to 5 softgel "pearls" daily) Dist. by LaneLabs-USA, Inc. Ingredients **$ Price Check**	**EPA:** 25 mg **DHA:** 50 mg **Total Omega-3s:** 85 mg Medium softgel Moderate concentration[6]	**APPROVED**	✓	✓	N/A[8]	$0.16 $0.36 to $0.60 *Gluten free* $17.95/150 softgels
Nordic Calamari Higher Potency Omega-3™ (1 softgel daily) Dist. by Applied Nutrition® Ingredients	**EPA:** 140 mg **DHA:** 360 mg Very large softgel High concentration	**NOT APPROVED** Total fat listed as 1 mg but was 1g (1,000 mg)	✓	✓	N/A[8]	$0.07 $0.33 $19.99/60 softgels

Vegetarian Source (Algal) Products:						
Deva® Non-Fish Vegan Omega-3 DHA (1 vegan softgel daily)* Dist. by Deva Nutrition, Inc Ingredients $ Price Check	**DHA:** 200 mg Medium/large softgel Moderate concentration[6]	**APPROVED**	✓	✓	N/A[8]	$0.12 $0.24 *Vegetarian, vegan, Gluten free* $21.23/90 vegan softgels
Ovega-3™ (1 vegetarian softgel daily) Dist. by Amerifit, Inc. Ingredients $ Price Check	**EPA:** 130 mg **DHA:** 320 mg **Total Omega-3s:** 500 mg Large softgel Extremely high concentration	**APPROVED**	✓	✓	✓	$0.07 ***Lowest cost from algal oil*** $0.33 *Vegetarian* $19.99/60 vegetarian softgels
Platinum Performance Platinum DHA Vegetarian Omega-3 DHA capsules (4 capsules daily)* Mfd. by Platinum Performance, Inc. Ingredients	**EPA:** 200 mg Medium capsule Moderate concentration	**APPROVED**	✓	✓	✓	$0.24 $1.92 *Vegetarian* $36.00/75 capsules
Cod Liver Oil Product:						
Carlson® Norwegian Cod Liver Oil (1 teaspoon daily)* Dist. by J.R. Carlson Laboratories, Inc. Ingredients $ Price Check	**EPA:** 400 mg **DHA:** 500 mg **Total Omega-3s:** 1,100 mg Teaspoon Low concentration	**APPROVED**	✓	✓	N/A[8]	$0.04 $0.35 *Refrigerate after opening* $34.94/16.9 fluid ounce bottle
Prenatal Products:						
Brain Strong™ (1 vegetarian softgel daily) Dist. by AmeriFit, Inc. Ingredients $ Price Check	**DHA:** 350 mg Large softgel Moderate concentration[6]	**APPROVED**	✓	✓	✓	$0.11 $0.39 Includes separate multivitamin *Vegetarian* $11.75/box [containing 30 vegetarian softgels and 30 multivitamin tablets]
One A Day® Women's Prenatal with DHA (1 softgel daily) Dist. by Bayer HealthCare LLC Ingredients $ Price Check	**EPA:** 240 mg **DHA:** 200 mg **Total Omega-3s:** 440 mg Very large softgel High concentration[6]	**APPROVED**	✓	✓	✓	$0.12 $0.55 Includes separate multivitamin $32.99/box [containing 60 softgels and 60 multivitamin tablets]
Children's Products:						
I.Q. Essentials™ (Purity Products) Kid's Omega-3 Fish Oil (5 softgels daily) Dist. by Purity Products® Ingredients	**EPA:** 26 mg **DHA:** 46 mg **Total Omega-3s:** 83 mg Medium softgel Moderate concentration[6]	**APPROVED**	✓	✓	N/A[a][8]	$0.32 $1.17 Highly purified Vitamin D $34.95/150 softgels
L'il Critters® Omega-3 DHA Gummy Fish (2 gummy fish daily) Mfd. by northwest natural products® Ingredients $ Price Check	**DHA:** 16 mg **Total Omega-3s:** 50 mg Chewable gummy Extremely low concentration[6]	**APPROVED**	✓	✓	N/A[8]	$0.37 $0.12 Purified Vitamins A, C, D, E *Gluten free* $7.99/135 gummy fish *Refrigerate after opening*
OmegaBrite Kidz Orange Cream (1/4 teaspoon daily for children age 6 and up; 1/2 to 1 teaspoon daily for adults)* Dist. by OmegaBrite Ingredients	**EPA:** 475 mg **DHA:** 112 mg **Total Omega-3s:** 700 mg ¼ Tablespoon High concentration	**APPROVED**	✓	✓[D]	✓[8]	$0.05 ***Lowest cost fish oil for children*** $0.31 Molecularly distilled $36.99/5 fluid ounce bottle

OmegaBrite Kidz Tutti Frutti (1/4 teaspoon daily for children age 6 and up; 1/2 to 1 teaspoon daily for adults)* Dist. by OmegaBrite Ingredients	**EPA:** 475 mg **DHA:** 112 mg **Total Omega-3s:** 700 mg ¼ Tablespoon High concentration	**APPROVED**	✓	✓[D]	✓[8]	$0.05 ***Lowest cost fish oil for children*** $0.31 Molecularly distilled $36.99/5 fluid ounce bottle
OmegaSmart Kids DHA (2 chewable softgels daily)* Dist. by ReNew Life Formulas® Ingredients **$ Price Check**	**EPA:** 25 mg **DHA:** 100 mg **Total Omega-3s:** 150 mg **Total Omega-6s:** 20 mg **Total Omega-9s:** 21 mg Medium softgel Moderate concentration[6]	**APPROVED**	✓	✓	N/A [a] [8]	$0.33 $0.83 Purified Vitamins C and D $24.99/60 chewable softgels
PharmaNutrients® learn™ (2 softgels daily) Dist. by PharmaNutrients, LLC Ingredients	**EPA:** 250 mg **DHA:** 100 mg **Total Omega-3s:** 500 mg Medium/large softgel Very high concentration	**NOT APPROVED**	✓EPA and DHA Found only 80.3% of claimed total omega-3s	✓	N/A [a] [8]	$0.06 $0.45 Ultra-refined and distilled *Gluten free* $13.60/60 softgels
Pet Products:						
1-800-PetMeds® Super Pure Omega 3 for Dogs & Cats (1 softgel per 50 pounds body weight daily) Dist. by 1-800-PetMeds Ingredients	**EPA:** 180 mg **DHA:** 120 mg Very large softgel Moderate concentration	**NOT APPROVED**	✓	✓	Spoiled (TOTOX value = 75.7)[3]	$0.08 $0.25 $14.98/60 softgels
Omega-Caps™ for Cats and Small Dogs (1 to 3 capsules daily)10 Dist. by Pet Health Solutions Ingredients	**EEPA:** 110 mg **DHA:** 73 mg Large softgel Moderate concentration[6]	**APPROVED**	✓	✓	✓	$0.15 $0.27 to $0.80 Vitamins A and D $15.99/60 softgels
Petco Healthy Skin & Coat Omega-3 for Dogs (1 softgel per 15 pounds of body weight daily) Mfd. by Garmon Corporation Ingredients	**EPA:** 140 mg **DHA:** 90 mg **Total Omega-3s:** 245 mg **Linoleic Acid (Omega-6):** 20 mg **Total Omega-9s:** 100 mg Very large softgel Low concentration[6]	**NOT APPROVED**	✓EPA, Total Omega-3s, Linoleic Acid, and Total Omega-9s Found only 69.2% of claimed DHA	✓	✓	$0.05 $0.11 $19.99/180 softgels

* Tested through CL's Voluntary Certification Program prior to, at time of, or after initial posting of this Product Review.

** Product identical in formulation and manufacture to a product that has passed testing but sold under a different brand. For more information see CL's Multi-Label Testing Program.

*** Be aware that cod or other fish liver oils are not always a good substitute for fish oil supplements as these may be high in vitamins A and D. Because these vitamins can be toxic, make sure that you do not exceed safe levels (see Multivitamin Product Review for Tolerable Upper Intake Levels (ULs) for vitamins and minerals). The one cold liver oil product listed in this review provided safe levels of vitamins A and D.

NA = Not Applicable. Unable to determine freshness because product contains lemon or other citrus flavor which interferes with rancidity measurement.

D = Product participated in optional dioxin testing at the request of its manufacturer/distributor through CL's Voluntary Certification Program and met WHO (World Health Organization) recommendations for dioxins.

WHO (World Health Organization) recommendations for dioxins.

🍁 - Canadian product.

[a] Some people are allergic to proteins in fish and krill (among other foods). Products are legally required to identify ingredients with allergic potential (including the species name) with a statement, e.g., "Contains: Fish (mackerel)." Not all of the fish oil products tested provided this complete labeling (those that did not have been indicated with a footnote in the sixth column in the results table above). It is possible that some manufacturers did not include this labeling because they believed the oil to be highly refined (and contain minimal protein). In any event, if you have an allergy to fish or krill, be cautious with products made of their oils, even if highly refined.

[b] Product attempts to declare the species of fish and comply with allergen labeling requirements but states that it contains Whitefish. This is not a recognized fish species and could refer to one of several species of fish.

[1] For softgel sizes see Range of EPA + DHA Concentrations and Pills Sizes.

[2] Concentration (wt/wt) of EPA + DHA in fish and/or krill oil claimed in product. See Range of EPA + DHA Concentrations and Pills Sizes for more information.

[3] TOTOX is a measure of spoilage (rancidity). TOTOX values above 26 indicated spoilage.

[4] Amounts shown are for general comparison purposes and are calculated from the price paid by ConsumerLab.com (without tax or shipping) and amounts of EPA/DHA claimed on labels or found if not claimed. Unit amounts of some products do not provide exactly 100 mg of EPA + DHA. Prices may vary by retailer and number of pills per package.

[3] Label reads: 1 softgel/day for children 4 & up.

[4] Label reads: Take 1 softgel, one time daily, with a meal. Pregnant/Lactating Women: After consulting with your physician, take 1 softgel, two times daily.

[5] Not tested but claimed on label.

[6] As amount of marine oil was not labeled, concentration (wt/wt) is based on amount of EPA + DHA in measured weight of supplement contents (excluding capsule).

[7] Product provided a range of EPA and DHA levels expected. Price comparison reflects the lowest claimed amount

[8] Product contains ingredients that interfere with freshness testing.

[9] Product claimed 1 mg of total fat but contains 1,035 mg of calamarine oil

[10] Label reads: Up to 20 lbs.: 1 Capsule Daily; 21 - 40 lbs.: 2 Capsules Daily; Over 40 lbs.: 3 Capsules Daily. Capsules may also be punctured and liquid contents squeezed onto meal

Unless otherwise noted, information about the products listed above is based on the samples purchased by ConsumerLab.com (CL). Manufacturers may change ingredients and label information at any time. So be sure to check labels carefully when evaluating the products you use or buy. If a product's ingredients differ from what is listed in this report, it may not be the same as what was tested.

The information contained in this report is based on the compilation and review of information from product labeling and analytical testing. CL applies what it believes to be the most appropriate testing methods and standards. The information in this report does not reflect the opinion or recommendation of CL, its officers or employees. CL cannot assure the accuracy of information provided to it by third parties. Liability to any person for any loss or damage caused by errors, omissions, or inaccuracies in this report is hereby disclaimed.

Copyright ConsumerLab.com, LLC, 2012. All rights reserved. Not to be reproduced, excerpted, or cited in any fashion without the express written permission of ConsumerLab.com LLC.

ConsumerTips:
What to Consider When Buying:

Getting EPA and DHA From Supplements:

When buying supplements containing EPA and/or DHA, keep in mind that products vary significantly in terms of the amounts and ratios of EPA and DHA. Be aware that only about a third of the oil from fish is EPA and DHA, although this may be higher (up to about 85% as EPA and DHA) in a "concentrated" product". Second, the ratio of EPA to DHA will vary. Products made from menhaden and other small oily fish, for example, tend to have a ratio of EPA to DHA of 1.5:1 so that a capsule claiming 1 gram (1,000 mg) of fish oil, of which 30% is EPA and DHA, provides 180 mg of EPA and 120 mg of DHA. Salmon oil naturally contains more DHA than EPA (often several times more) and products made only from algal oil will contain only DHA. With a more concentrated product, one may be able to take fewer capsules of the same size. Your daily intake should be based on your reason for taking it (see below) and the amount that you are already getting from your diet.

Forms of Fish Oil -- Natural Triglycerides, Ethyl Esters, or Re-Esterified Triglycerides: Is One Better?

The omega-3 fatty acids (EPA and DHA) in fish oil naturally occur in the form of triglycerides (fatty acids attached to glycerol). However, in most supplements, fish oil is not in this natural triglyceride form, but in a semi-synthetic form known as ethyl esters. The ethyl ester form is created by exposing the fish oil to ethanol, which replaces the glycerol molecule. This allows the fish oil to undergo molecular distillation: the oil is heated under high vacuum, causing certain other compounds, such as contaminants, to be removed while concentrating the omega-3 fatty acid ethyl esters. This distillation may also reduce levels of some potentially beneficial compounds (such as small amounts of vitamins) found in fish oil, but this has to be weighed against the benefit of removing contaminants and concentrating the EPA and DHA. Natural fish oil may also be purified and concentrated without solvents using methods such as supercritical CO2 extraction (which uses a gas and some heat) or winterization (which uses cold temperatures). A third form of fish oil on the market is known as re-esterified triglycerides: It is made by chemically converting ethyl esters back to triglycerides, so that most of the omega-3 fatty acids are, once again, triglycerides.

After you swallow fish oil in any of these forms, your body's digestive enzymes free the omega-3 fatty acids so they can be absorbed. A very small amount of ethanol (pure alcohol) is released from the ethyl ester form into the gut during this process, although the amount is likely to be insignificant for most people. It has been found that people absorb about 37% more omega-3 fatty acids from natural fish oil than from the ethyl ester form (Dyerberg, PLEFA 2010). Interestingly, re-esterified triglyceride fish oil is absorbed even better than natural fish oil (24% more fatty acids are absorbed). Regardless of these differences in absorption, any of these forms can significantly raise the levels of DHA and EPA in your blood.

Because the ethyl ester form is the most widely available form on the market, most of the clinical studies with fish oil supplements have been conducted with this form, which have shown it to be generally safe, as well as effective for certain conditions such as improving cholesterol levels in people with high triglycerides (see What It Does).

A recently published experiment in mice showed that DHA from natural fish oil relaxed smooth muscle in vascular tissue and temporarily lowered blood pressure, while DHA in the ethyl ester form did not. In fact, the ethyl ester form blocked natural DHA from having this blood pressure-lowering effect. Similar effects were found when comparing natural and ethyl ester forms of EPA (Hoshi, PNAS 2013). Although these findings might, at first, seem concerning, the doses were administered to the mice intravenously (IV), thereby allowing the ethyl esters into the blood; this could not happen if they had been taken by mouth, like a supplement. The findings, however, may raise issues for people who get fish oil as part of parenteral (IV) nutrition, as the ethyl ester and triglyceride forms may affect their blood pressure differently.

In summary, each of the three forms of fish oil, after being digested, will end up in the same form your blood. However, due to their better absorption, it may be fair to pay some premium for fish oil in the natural or re-esterified triglyceride forms. If you choose to use either of these two forms, look for products which list EPA and DHA as "triglycerides." An example in this Review is *Douglas Labs Quell Fish Oil*, which lists that it is a "Supercritical CO2 triglyceride concentrate." Be aware that some products with "natural" in the name don't seem to provide truly natural fish oil, but may just start with natural fish oil which is then chemically treated or simply have "natural" as part of their brand name. For example, *Kirkland Signature Natural Omega-3 Fish Oil* lists its omega-3 fatty acids as "natural triglycerides" although it also claims to be "molecularly distilled." Since molecular distillation requires chemical conversion, this product may actually contain re-esterified triglycerides. To provide better clarity on this issue, future reviews of fish oils by ConsumerLab.com may include analyses of the chemical forms, in addition the current battery of tests.

Also note that to avoid contaminants in an *un*refined supplement, it's best to choose those made from small, oily fish that are low in food chain, such as anchovy, sardines or menhaden. Also be aware that fish "liver" oils can contain high levels of vitamins, such as vitamin A, which can be toxic at excessive doses (see Concerns and Cautions below for more information).

You'll find that many products also contain vitamin E or other antioxidants to stabilize the oils and prevent them from becoming rancid.

Algal and DHA-Rich Oil

Algae, which are aquatic plant-likes organisms, are a source EPA and DHA. Algal oil supplements currently on the market principally provide DHA derived from microalgae.

A recent analysis of clinical studies using relatively high dose DHA from algal oil (averaging 1,680 mg of DHA per day) found it to be similar to high dose EPA and DHA in lowering triglycerides and increasing HDL cholesterol (Bernstein, J Nutr 2011). The high-dose algal oil lowered triglycerides by about 15% and increased HDL cholesterol by about 5%. The algal oil also caused an 8% increase in LDL cholesterol. LDL cholesterol is often thought of as "bad" cholesterol; however, the LDL particles themselves became larger in size, which may make them less likely to harden arteries. Similar results have been seen with purified DHA from fish oil. DHA has also been found to be more effective than EPA at increasing HDL2 cholesterol -- the subfraction of HDL cholesterol that may be most protective against coronary heart disease (Mori, Am J Clin Nutr 2000).

If you are primarily interested in DHA or are vegetarian, algal oil supplements -- although more expensive than most fish oil supplements -- are a good option and they are typically very low in contaminants since algae is low on the food chain.

Krill Oil

Like fish oil, oil from krill (a shrimp-like crustacean) contains significant amounts of both EPA and DHA. It also contains phospholipids and astaxanthin. Astaxanthin is naturally produced by a type of algae and, through the food chain, provides the pink coloration of krill, salmon, trout, krill, shrimp and other crustaceans. (A typical 4-ounce serving of farmed Atlantic salmon provides approximately 1 mg of astaxanthin and a similar serving of wild Pacific salmon provides about 4.5 mg. Synthetic astaxanthin is also produced and differs slightly chemically from natural astaxanthin in the predominance of specific isomeric forms.) Preliminary studies indicate that krill oil, like fish oil, has a beneficial effect on cholesterol and triglyceride levels and anti-inflammatory applications. See the article on Krill Oil in the Encyclopedia. It has been suggested that the phospholipids in krill oil enhance absorption of its EPA and DHA, although this has not been established.

Krill is a primary food source for certain whales, seals, penguins and other animals. It's harvesting has been a subject of environmental debate. Proponents of the use of krill oil in supplements argue that it is plentiful and only a small percentage of total krill biomass is being harvested, most of which is used in fish meal and not for direct human consumption. There are also catch limits for sustainable exploitation established by a conservation commission known as CCAMLR, and registration and monitoring is required of harvesting vessels. However, other groups, such as the Antarctic Krill Conservation Project counter that krill harvesting may have detrimental effects on sea life and on other animals that depend directly or indirectly on krill, and that current limits and monitoring are insufficient.

Calamari Oil

Squid, also known as calamari (particularly when referring to it as a food) are a rich source of omega-3s. Unlike fish oil, calamari oil contains a higher amount of DHA than EPA (as you can see from the results table above). As squid have a short life cycle, they may be less likely to accumulate toxins than longer-lived fish, particularly those higher up on the food chain. A common source of calamari oil in supplements is trademarked Calamarine, which, according to the website of its manufacturer, Pharma Marine, is a socially responsible source of marine omega-3s as it is "produced solely from by-products of existing food production of calamari" and may be more eco-friendly than other animal sources based on how it is harvested.

Enteric-coated pills:

Some fish oils come in enteric-coated pills, designed to release the oils in the intestine rather than the stomach -- to help avoid fishy aftertaste or fishy smelling burps. As long as these pills release on time, this should not compromise your absorption of omega-3s because oils are not absorbed in the stomach, but in the intestine. With the help of bile acids, oils get emulsified (made into smaller droplets) in the upper intestine so they can be more effectively acted on by pancreatic lipase (an enzyme) and absorbed further down the small intestine. If this doesn't happen, less oil may be absorbed.

So while enteric-coated pills may be fine, if you notice more oily stools, this would be an indication that the oils are not being well absorbed. Also be aware that some of these enteric coatings are made with acrylics (such as methacrylic acid copolymer) that don't break down -- they are like thin latex balloons intended to pop open under specific conditions (they are also somewhat stiffer than regular softgels). You might find remains of these pills in your stool, but there is no reason to be concerned.

Unfortunately, as we found in this review, one enteric coated product failed to pass testing by releasing its ingredients too early. You will still get omega-3s from such a product, but may not get the expected reduction in fish odor.

Getting EPA and DHA From Food:
You may want to consider getting omega-3 fatty acids directly from fish. For the general population, the American Heart Association (AHA) recommends at least two 3 oz servings of fish per week. For people with heart disease or cardiac risk factors, some experts recommend eating four 3-ounce servings of fatty fish per week. Fatty fish, such as the following, have higher levels of omega-3 fatty acids:

- Anchovies
- Bluefish
- Carp
- Catfish
- Halibut
- Herring
- Lake trout
- Mackerel
- Pompano
- Salmon *
- Striped Sea Bass
- White Tuna (Albacore) **
- Whitefish

Source: U.S. Department of Agriculture, Agricultural Research Service. 2001.
* Farmed salmon may contain more PCBs than other salmon.
** May contain an excessive amount of mercury.

Total amounts of omega-3s vary among fish, but ones listed above are all good sources. A three-ounce serving (half a can) of canned albacore "white" tuna, for example, contains about 2.5 grams of fat, about 30% of which is EPA (200 mg) and DHA (500 mg). "Light" tuna, contains less than half the omega-3 oils of "white" tuna. A three-ounce serving of canned salmon contains about 4.5 grams of fat of which 17% is EPA (166 mg) and DHA (587 mg).

Eggs fortified with DHA are also available in the U.S. and claim to contain about 150 mg of DHA in each egg. Chickens producing these eggs are typically fed algal DHA. Algal DHA is also an approved food ingredient, so that foods and beverages can be fortified with DHA and be considered vegetarian. Because some formula-fed infants may not be converting enough ALA to DHA, some formulas are also available with DHA -- which has been added to formulas for premature infants for many years.

Amounts of EPA and/or DHA in fortified foods and beverages tend to be about 50 to 100 mg per serving -- much lower than that found in a serving of fish or in a traditional fish oil supplement. While omega-3 fortified products can contribute to your intake of these fatty acids, they are typically not sufficient in themselves to provide the full generally recommended amounts of EPA or DHA. Be aware that ConsumerLab.com found, in the past, that some fortified foods or beverages claimed to supply certain percentages of a "Daily Value" of EPA and DHA (which they claimed to be160 mg of EPA and DHA). Such statements are not correct. A "Daily Value" for omega-3 fatty acids has not been established.

Contaminants in Fish vs. Supplements
Mercury:
Mercury is not a known contaminant in fish oil or other marine oil supplements. ConsumerLab.com has never found mercury in such supplements. Mercury is a potential problem, however, in fish meat. Levels of pollutants, such as mercury, tend to be higher in long-lived, larger fish, particularly shark, swordfish, king mackerel, and tilefish. These fish tend to average about 1,000 ppb (parts per billion) of mercury -- the FDA limit for human consumption -- while most other fish tend to have about one-tenth to one-third of this amount. Eating a fish with 1,000 ppb of mercury is not necessarily toxic, but it should not be consumed by young children and pregnant or nursing women, or by anyone on a regular basis. The Environmental Protection Agency (EPA) has also advised that fresh-water fish may contain more mercury than commercially caught fish and advises that "If you are pregnant or could become pregnant, are nursing a baby, or feeding a young child, limit consumption of fish caught by family and friends to one meal (about 6 ounces) of fish per week." The same limit is recommended for albacore ("white") tuna, as it may occasionally contain excessive levels of mercury.

PCBs:
PCBs occur in nearly all fish oil supplements but almost always at extremely low levels, as shown in our testing. You are likely to get a much higher amount of PCBs from eating fish. A study of fish sold in markets in Germany, for example, showed oily fish (such as salmon) to contain about 2 picograms of dioxin-like PCBs (dl-PCBs) *per gram* (Karl, J.Verbr. Lebensm 2008). A small serving (3 ounces or 85 grams) of salmon, therefore, would contain about 170 picograms of dl-PCBs, which is about 17 times the amount found in a two-softgel serving of the fish oil supplement identified in this review as most contaminated with dl-PCBs (*Xtendlife Omega 3*). Even a serving of less oily fish (which tend to have fewer PCBs but also less omega-3s) is likely to contain several times more PCBs than a typical fish oil supplement.

The FDA permits a 3 ounce serving of fish to contain about 169,000,000 picograms of total PCBs, 1,000 times more than in any of the products in this review. The EPA, using a more conservative approach, estimates that the average adult can consume 1,400,000 picograms of total PCBs per day without harmful effects. If you are concerned about mercury and other potential contaminants, concentrated fish oil products may be a better choice, provided that they contain the claimed amount of oils and meet other quality parameters tested for in this review.

Omega-3 vs. Omega-6 Fatty Acids:
Some experts suggest that the American diet contains too little omega-3 fatty acids and too much of another essential fatty acid family called the omega-6 fatty acids. Omega-6s are found in oils from corn, sunflower, soy, peanut and other plants. The typical ratio of omega-6's to omega-3's in the American diet is believed to be as high as 14:1 (14 grams of omega 6's for every gram of omega-3's); these experts suggest that a ratio of no more than 3:1 (3 grams of omega-6's for every 1 gram of omega-3) may be preferable. However, the evidence for this recommendation is sketchy at best.

What to Consider When Using:
Dosage:

- In the U.S., there is no official recommended intake for EPA and DHA in healthy people. However, some other countries recommend from 300 mg to 500 mg per day of a combination of EPA and DHA. This is roughly equivalent, if not greater than, the amount of omega-3s obtained from two servings of fish per week, as suggested by the American Heart Association (See Getting EPA and DHA from Food).
- It is unclear whether fish oil supplementation reduces the risk of coronary events (such as heart attacks) among people with coronary artery disease (CAD) (Kwak, Arch Intern Med 2012). A diet high in fatty fish (2 servings of marine fish per week) continues to be recommended as it provides omega-3 fatty acids and replaces less healthful protein sources, such as red meat (Hu, Arch Intern Med 2012). A study in Norway among CAD patients showed only those with intakes lower than 300 mg per day of omega-3 fatty acids had a slightly increased risk of coronary events. There was no significant difference in risk among groups with high (580 mg), very high (1,360 mg) or even extremely high (2,640 mg) daily intakes of omega-3's (Manger, Am J Clin Nutr 2010).
- A typical dose of fish oil for specific therapeutic uses is 6-12 grams daily. However, as noted above, EPA and DHA represent only part of the total oil in fish and their levels vary among products. For most therapeutic uses of omega-3s, the daily dosage of total EPA and DHA tested in studies has ranged from 1-6 grams daily. Higher dosages have been tried by some researchers, especially for the treatment of schizophrenia, Raynaud's phenomenon, and lupus.
- For people with extremely high triglycerides (greater than 1,000 mg/dL) who have not responded well to other treatments, the American Heart Association recommends fish oil capsules. In treating patients with high triglycerides, about 5 grams of combined EPA and DHA is recommended daily. Due to this large dose, physicians typically recommend using a highly concentrated fish oil product. A prescription fish oil, *Lovaza (previously known as Omacor and still sold under that name in other countries), provides 840 mg of EPA and DHA per 1 gram capsule (an 84% concentration), of which approximately 465 mg is EPA and 375 mg is DHA.* Similarly high concentrations can be found among dietary supplements (see results table above for products listed as "Extremely high" in concentration in the second column), although such products may be designed as smaller softgels with smaller doses. In any event, multiple pills will be needed, so an alternative is a highly concentrated liquid, where a couple of teaspoons full can supply the proper dose.
- As little as one gram daily of combined EPA and DHA may be adequate for reducing risk of a recurrent heart attack.
- For pregnant and nursing women, the recommended dose of DHA, from either supplements or fish, is 100 to 200 mg per day. 400 mg DHA daily has been shown to reduce colds during initial months of infancy among women with otherwise low DHA intake (Imhoff-Kunsch, Pediatrics 2011). A study using higher amounts of omega-3's (800 mg DHA and 100 mg EPA daily) showed reduced risk of very premature birth as well as lower risk of egg allergy in infants (Makrides, JAMA 2010, Palmer, BMJ 2012).
- For potentially reducing the risk of developing of retinal disease, consumption of approximately 200 mg or more of EPA and DHA per day may be helpful. This is based on the dietary intakes of participants in the AREDS study who had the lowest incidence of retinal disease. A separate study suggests benefit with consumption of at least one serving of fish per week, particularly canned tuna or dark-meat fish (salmon e.g., mackerel, salmon, sardines, bluefish, and

swordfish), which works out to consumption from the diet of about 100 mg of EPA and 230 mg of DHA per day (Christen, Arch Opthamol 2011). In the AREDS2 study, which is currently underway, researchers have chosen to test the effect of a daily supplement containing 650 mg of EPA and 350 mg of DHA. (See What It Does: Eye Disease, above, for more information).

- For maintaining weight during initial chemotherapy, fish oil providing 2.2 grams of EPA per day (Murphy, Cancer 2011).
- For depression, 2,500 mg (consisting of 1,670 mg EPA and 830 mg DHA) taken once daily for eight weeks (Rondanelli, J Am Col Nutr 2010). In mildly cognitively impaired individuals, combinations providing either 1,550 mg DHA with 400 mg EPA or 1,670 EPA with 160 mg DHA have also shown benefit over 6 months (Sinn, Br J Nutr 2011). Also, 1,000 mg per day of EPA together with the prescription drug fluoxetine (Prozac) appears to be more effective than either EPA or fluoxetine alone.
- For anxiety, 2,496 mg once daily (providing 2,085 mg EPA and 348 mg DHA), taken once daily (Kiecolt-Glaser, Brain Behav Immun 2011).
- For improvement in working memory in healthy, young adults, 2,000 mg of fish oil (providing 930 mg EPA and 750 mg DHA) daily (Narendran, PLoS One 2012).
- For strength training, 1,000 mg of fish oil (providing 180 mg EPA and 120 mg DHA) twice daily (Rodacki, Am J Clin Nutr 2012).

Taking fish oil with fatty meals helps increase its absorption (Dyerberg, PLEFA 2010). Fish oils are also best tolerated when taken with meals, and, if possible, should be taken in divided doses, i.e., divide the dose in half and take twice daily, or in thirds and take three times a day.

Keep It Fresh:
Omega-3 fatty acids can spoil, so it is best to keep products out of heat and light. Once opened, tightly reseal the container. If possible, refrigeration can help prolong freshness and is particularly important with bottled liquids. A slight cloudy appearance of the oil is normal after refrigeration -- just shake the bottle before use. If you use a bottled liquid, purchase a size that you will completely use within a few weeks because once air is introduced into the bottle, spoilage may begin.

Concerns and Cautions:

While fish oil supplements are generally considered safe, there are a few caveats and cautions you should take into consideration before you buy. While krill oil has not been as extensively studied as fish oil, it is reasonable to assume that the same concerns and cautions apply.

- The most common side effects are fishy smelling burps and diarrhea.
- Up to about 20 grams of fish oil can be well tolerated by most adults. However, such high amounts may not be beneficial and the FDA recommends that consumers not exceed more than a total of 3 grams per day of EPA and DHA omega-3 fatty acids, with no more than 2 grams per day from a dietary supplement.
- Be aware that cod or other fish liver oils are not always a good substitute for fish oil supplements as these may be high in vitamins A and D. Because these vitamins can be toxic, make sure that you do not exceed safe levels (see Multivitamin Product Review for Tolerable Upper Intake Levels (ULs) for vitamins and minerals).
- The only significant safety concerns regarding fish oil involve its apparent "blood thinning" effect. On this basis, fish oil should be used only under a physician's care by people with bleeding disorders such as hemophilia, those taking strong prescription blood thinners, such as Coumadin (warfarin) or heparin, and those expecting to undergo surgery.
- If you take blood pressure lowering medication, be aware that fish oil may further lower blood pressure.
- High doses (over 3 grams per day) of fish oil may suppress the immune system. Unless medically necessary, such doses should be avoided, particularly by immunocompromised individuals.
- Contrary to earlier reports, fish oil does not appear to adversely affect blood sugar levels in people with diabetes.
- Some people are allergic to proteins in fish, krill, and calamari/squid (among other foods). Supplements are required to identify foods with allergic potential (including the species name) with a statement, e.g., "Contains: Fish (mackerel)." Not all of the fish oil products tested provided this complete labeling (those that did not have been indicated with a footnote in the sixth column in the results table above). It is possible that some manufacturers did not include this labeling because they considered the oil to be highly refined (and contain minimal protein). In any event, if you have an allergy to fish, krill, or calamari be cautious with products made of their oils, even if highly refined.

See the Encyclopedia for more information about clinical studies on Fish and Marine Oil (Omega-3) as well as Krill Oil.

To further assist consumers, ConsumerLab.com licenses its flask-shaped CL Seal of Approved Quality (see The CL Seal) to manufacturers for use on labels of products that have passed its testing. ConsumerLab.com will periodically re-evaluate these products to ensure their compliance with ConsumerLab.com's standards.

Also see ConsumerLab.com's tests of raw materials used in omega-3 supplements.

Information on this site is provided for informational purposes only. It is not an endorsement of any product nor it is it meant to substitute for the advice provided by physicians or other healthcare professionals. The information contained herein should not be used for diagnosing or treating a health problem or disease.

back to top

Follow ConsumerLab.com on Twitter | **Become a Fan on Facebook**
Home | **Product Tests** | **Brands Tested** | **Encyclopedia** | **Answers** | **Where to Buy Products** | **Group Subscription**
| **RENEW** | **Sign Out** | **My Account**
News | **Recalls & Warnings** | **Raw Materials Tests** | **Testing Programs** | **The CL Seal** | **CL Survey** | **About Us**
In The News | **RDAs** | **Gift Memberships** | **Join Free Newsletter** | **Privacy Policy** | **Site Map** | **Testimonials** | **Contact Us/Help**

©2013 ConsumerLab.com, LLC. All rights reserved. A single copy of a report may be printed for personal use by the subscriber.
It is otherwise unlawful to print, download, store or distribute content from this site without permission.
ConsumerLab.com name and flask logo are both registered trademarks of ConsumerLab.com, LLC.