Omega-3 fatty acids are polyunsaturated, meaning they contain more than one double bond. They are called omega-3 because the first double bond counting from the methyl end of the fatty acid is located at the third carbon.

**Types**
- Alpha-linolenic acid (ALA)
- Eicosapentaenoic acid (EPA)
- Docosahexaenoic acid (DHA)

**Alpha-linolenic acid (ALA)**
The scientific abbreviation is 18:3n-3, signifying that ALA is an 18-carbon fatty acid with 3 double bonds (18:3). The second portion (n3) demonstrates that ALA is an omega-3 fatty acid. ALA is essential, but cannot be synthesized in humans; therefore, it must be obtained from the diet. Other longer chain omega-3 fatty acids can be synthesized in the body from ALA. This includes EPA and DHA.

**EPA and DHA**
The scientific abbreviation for EPA is 20:5n-3, and for DHA 22:6n-3. These two omega-3 fatty acids are referred to as marine-derived omega-3 fatty acids because they occur abundantly in certain species of fish, whereas ALA is considered a plant-derived omega-3 fatty acid.

**Alpha-linolenic acid: Sources**

<table>
<thead>
<tr>
<th>Food</th>
<th>Serving</th>
<th>ALA (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flaxseed Oil</td>
<td>1 tablespoon</td>
<td>8.5</td>
</tr>
<tr>
<td>Walnuts, English</td>
<td>1 ounce</td>
<td>2.6</td>
</tr>
<tr>
<td>Flaxseeds</td>
<td>1 tablespoon</td>
<td>2.2</td>
</tr>
<tr>
<td>Walnut Oil</td>
<td>1 tablespoon</td>
<td>1.4</td>
</tr>
<tr>
<td>Canola Oil</td>
<td>1 tablespoon</td>
<td>1.2</td>
</tr>
<tr>
<td>Mustard Oil</td>
<td>1 tablespoon</td>
<td>0.8</td>
</tr>
<tr>
<td>Soybean Oil</td>
<td>1 tablespoon</td>
<td>0.9</td>
</tr>
<tr>
<td>Walnuts, Black</td>
<td>1 ounce</td>
<td>0.6</td>
</tr>
<tr>
<td>Olive Oil</td>
<td>1 tablespoon</td>
<td>0.1</td>
</tr>
</tbody>
</table>
EPA and DHA: Sources

<table>
<thead>
<tr>
<th>Food</th>
<th>Serving</th>
<th>EPA (g)</th>
<th>DHA (g)</th>
<th>Amt providing 1g of EPA + DHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herring, Pacific, Cooked</td>
<td>3 ounces</td>
<td>1.06</td>
<td>.75</td>
<td>1.5 ounces</td>
</tr>
<tr>
<td>Salmon, Chinook, cooked</td>
<td>3 ounces</td>
<td>.86</td>
<td>.62</td>
<td>2 ounces</td>
</tr>
<tr>
<td>Salmon, Atlantic, cooked</td>
<td>3 ounces</td>
<td>.28</td>
<td>.95</td>
<td>2.5 ounces</td>
</tr>
<tr>
<td>Oysters, Pacific, cooked</td>
<td>3 ounces</td>
<td>.75</td>
<td>.43</td>
<td>2.5 ounces</td>
</tr>
<tr>
<td>Salmon, Sockeye, cooked</td>
<td>3 ounces</td>
<td>.45</td>
<td>.60</td>
<td>3 ounces</td>
</tr>
<tr>
<td>Trout, Rainbow, cooked</td>
<td>3 ounces</td>
<td>.40</td>
<td>.44</td>
<td>3.5 ounces</td>
</tr>
<tr>
<td>Tuna, white, in water</td>
<td>3 ounces</td>
<td>.20</td>
<td>.54</td>
<td>4 ounces</td>
</tr>
<tr>
<td>Crab, Dungeness, cooked</td>
<td>3 ounces</td>
<td>.24</td>
<td>.10</td>
<td>9 ounces</td>
</tr>
<tr>
<td>Shrimp, cooked</td>
<td>3 ounces</td>
<td>.15</td>
<td>.12</td>
<td>11 ounces</td>
</tr>
<tr>
<td>Cod, Pacific, cooked</td>
<td>3 ounces</td>
<td>.09</td>
<td>.15</td>
<td>12.5 ounces</td>
</tr>
<tr>
<td>Fish oil, Menhaden</td>
<td>1 gram</td>
<td>.13</td>
<td>.09</td>
<td>5 grams</td>
</tr>
<tr>
<td>Fish oil, Salmon</td>
<td>1 gram</td>
<td>.13</td>
<td>.18</td>
<td>3 grams</td>
</tr>
</tbody>
</table>

Benefits of Fish and Omega 3 fatty acids

**Coronary Heart Disease (CHD)**
A study following 1,822 men for 30 years found that mortality from CHD was 38% lower in men who consumed an average of at least 35 g (1.2 ounces) of fish daily than in men who did not eat fish, while mortality from myocardial infarction (MI) was 67% lower.

Results of randomized controlled trials in individuals with documented coronary heart disease continue to suggest a beneficial effect of dietary and supplemental omega-3 fatty acids. Therefore, the American Heart Association has recommended that individuals with documented CHD consume 1 g/day of EPA and DHA combined.

**Sudden Cardiac Death**
In a prospective study, omega-3 fatty acid intakes equivalent to two fatty fish meals per week were associated with a 50% decrease in the risk of primary cardiac arrest. Plasma levels were inversely related to the risk of sudden death, further supporting the idea that omega-3 fatty acids are partially responsible for the beneficial effect of fish consumption in decreasing the risk of sudden cardiac death.
**Stroke**

A stroke is a result of impaired blood flow to a region of the brain, which may be due to obstruction of a blood vessel by a blood clot (thrombotic or ischemic stroke) or the rupture of a blood vessel (hemorrhagic stroke).

Studies suggest that increased omega-3 fatty acid intake by eating more fish may decrease the incidence of stroke and the risk of thrombotic or ischemic stroke, but not hemorrhagic stroke.

**Cancer**

Animal models have shown beneficial results from increased intakes of EPA and DHA. Additionally, cell culture studies have shown promising results. However, in human studies, few have demonstrated significant relationships between fish or omega-3 fatty acid intake and the risk for breast, prostate, or colorectal cancers.

**Diabetes Mellitus**

Cardiovascular diseases are the leading causes of death in individuals with diabetes. Hypertriglyceridemia (fasting serum TG of 200 mg/dl or higher) is a common lipid abnormality in individuals with Type 2 diabetes. There have been a number of randomized controlled trials that have found fish oil supplementation significantly lowers serum triglyceride levels in diabetic individuals.

A 16-year study found that those with higher fish intakes were associated with significantly decreased risks of CHD over the duration of the study, suggesting that increasing EPA and DHA may be beneficial to diabetic individuals, especially those with elevated serum triglycerides.

**Inflammatory Diseases**

Rheumatoid arthritis is the most common systemic inflammatory rheumatic (joint) disease. Studies have determined the effects of omega-3 fatty acids on rheumatoid arthritis. Clinical benefits were observed at a minimum dose of 3g/day of EPA and DHA, and were not apparent until at least 12 weeks of supplementation.
Inflammatory Bowel Disease
Ulcerative Colitis and Crohn’s disease

Individuals with Crohn’s disease supplemented with EPA and DHA, remained in remission longer than those given a placebo. In studies of ulcerative colitis, supplementation with EPA and DHA had significant improvements.

Immunoglobulin A Nephropathy
This is an immune function disorder in the kidneys. Omega-3 fatty acids have the potential to modulate immune function and a study is under way to compare traditional treatment versus fish oil supplementation.

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Experimental Obesity
Functional Foods
Health and Performance Enhancement
Nutrition and Chronic Diseases
Nutrition and the Brain
Dementia, Alzheimer’s and healthy aging
Diet, exercise, weight loss and weight loss maintenance

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References: