

OMEGA-3 INDEX REPORT

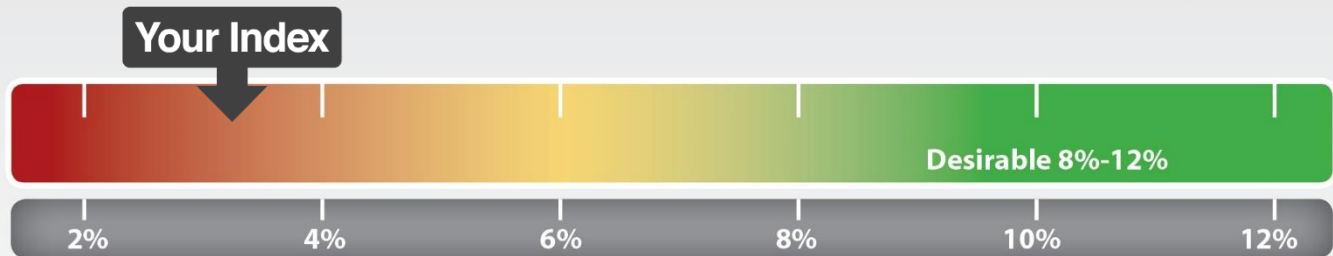
NAME: Doe, Jane
DOB: 01/01/1978
ID: JDoe

COLLECTION DATE: 1/3/2020
RESULT DATE: 1/8/2020
PROVIDER: Dr. John Smith

Your Index

3.6%

Reference Range*: 2.51%–11.79%



* Reference Ranges encompass about 99% of US adults. Visit our FAQ section for more information.

An Omega-3 Index in the range of 8-12% is one indicator of better overall health. As a part of an overall healthy lifestyle, an Omega-3 Index in the 8-12% range may help to maintain heart, brain, eye and joint health. The best way to increase your Omega-3 Index is to eat more omega-3 fatty acids, specifically EPA and DHA. These are found primarily in fish, especially "oily" fish. They can also be obtained from dietary supplements (fish, krill, cod liver and algal oils).

US Recommendations for EPA and DHA intakes

The [2015-2020 Dietary Guidelines for Americans](#) states, "For the general population, consumption of about 8 ounces per week of a variety of seafood, which provide an average consumption of 250* mg per day of EPA and DHA, is associated with reduced cardiac deaths among individuals with and without pre-existing cardiovascular disease."

The advice from the [American Academy of Nutrition and Dietetics](#) is, "Based on recent literature, increasing consumption of polyunsaturated fatty acids with a particular focus on increasing omega-3 intake (i.e., striving to consume two or more servings of fatty fish per week to provide at least 500* mg EPA and DHA per day...) is desirable."

The [FDA](#) has determined that the consumption of up to 3000 mg/day of EPA and DHA is generally recognized as safe.

The amount of EPA+DHA you would need to eat in order to raise your Omega-3 Index into the desirable range cannot be predicted with certainty. Many factors – your age, sex, weight, diet, genetics, smoking habits, medications you may be taking, and other medical conditions – can all influence your body's response to EPA+DHA. However, research has shown that on average for most Americans, weekly consumption of 3 servings of non-fried fish plus taking a supplement should raise the Omega-3 Index into the desirable range.

It should be noted that, because they have a different chemical structure than EPA and DHA, the omega-3 fatty acid found in flax or chia seeds (alpha-linolenic acid, ALA) are distinct from EPA and DHA. We do not recommend any increase to ALA intake for the purpose of increasing Omega-3 Index.

After you increase your intake of EPA+DHA, your Omega-3 Index will begin to slowly go up within a few days, but will continue to change for 3-4 months. To know how your own body responds to an increased intake of EPA+DHA, we recommend that you re-measure your Omega-3 Index in 3-4 months. Once you reach the healthy range for Omega-3 Index, we recommend that you re-test every 6 months to make sure it is staying there.

*The difference between 250 and 500 mg/day recommendations is that the former would be provided by "8 oz (i.e., 2, 4-oz servings) of a variety of seafood" whereas the latter would be provided by the same number of servings of "fatty fish." Fatty fish contains about twice the amount of EPA and DHA as does seafood in general.

OMEGA RATIOS REPORT

NAME: Doe, Jane
DOB: 01/01/1978
ID: JDoe

COLLECTION DATE: 1/3/2020
RESULT DATE: 1/8/2020
PROVIDER: Dr. John Smith



What fatty acids are included?

Omega-6:Omega-3 ratio is calculated by dividing the sum of 7 omega-6 fatty acids by the sum of 4 omega-3 fatty acids. The only two fatty acids included in the AA:EPA ratio are arachidonic acid (AA, 20:4n-6) and eicosapentaenoic acid (EPA, 20:5n-3).

What are the desirable ranges?

The desirable range for the omega-6:omega-3 ratio is 2.7:1 to 1.7:1, and the desirable range for the AA:EPA ratio is 4.9:1 – 2.1:1.

These ranges were derived from thousands of individuals whose RBC samples were analyzed for the Omega-3 Index and for these two ratios. Because the Omega-3 Index is so strongly related to each of these ratios, the desirable ranges for these two ratios were calculated to correspond to the desirable range for the Omega-3 Index.

How can I improve these ratios?

As described in the Omega-3 Index report, the best way to lower both the Omega-6:Omega-3 and the AA:EPA ratios is to consume more omega-3 fatty acids. As described below in the Omega-6 fatty acids section of this report, the latest scientific literature supports higher, not lower, intakes/levels of the principal omega-6 fatty acid, linoleic acid. Therefore, we do not recommend lowering your intake of linoleic acid as a strategy to lower these ratios. Raising your intake of EPA+DHA from seafoods and/or omega-3 supplements will, however, decrease both of these ratios (and raise your Omega-3 Index).

How long does it take to decrease these ratios?

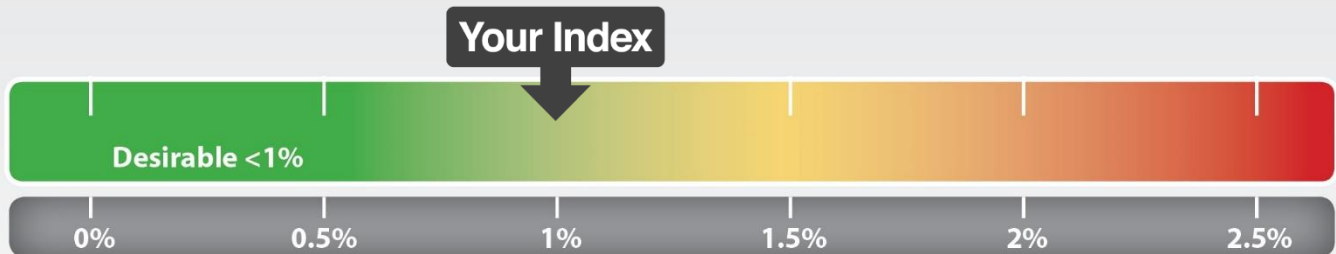
As described in the Omega-3 Index report, it will take 3-4 months for these ratios to reach their new levels.

TRANS FAT INDEX REPORT

NAME: Doe, Jane
DOB: 01/01/1978
ID: JDoe

COLLECTION DATE: 1/3/2020
RESULT DATE: 1/8/2020
PROVIDER: Dr. John Smith

Your Index
Reference Range*: 0.30% - 2.42%



* Reference Ranges encompass about 99% of US adults. Visit our FAQ section for more information.

Trans fatty acids (commonly called *trans* fats) in our blood come only from the food we eat. Our body cannot make *trans* fats, like it can saturated and mono-unsaturated fats. The vast majority (80-90%) of *trans* fats we eat in America are industrially-produced *trans* fats*. These are produced by the "partial hydrogenation" of liquid vegetable oils, which is a chemical process that converts liquid oils into solid margarines and shortenings. Consumption of industrially-produced *trans* fats has been linked to poorer heart health and increased levels of "bad" cholesterol and decreased levels of "good" cholesterol. The Dietary Guidelines for Americans state that "*trans* fats can raise the risk of developing cardiovascular disease." Accordingly, the Guidelines recommend "keeping the intake of *trans* fat as low as possible by limiting foods containing partially hydrogenated oils." The US Food and Drug Administration (FDA) has taken several steps to remove as much industrial *trans* fats from the American diet as possible.

Unfortunately, it is virtually impossible to know for certain how much *trans* fat is in your diet. This is because varying amounts of *trans* fats are included in thousands of food products, and the amounts in any given food product can change over time depending on the prices of the fats used to produce the food and the success of food companies in finding other fats to replace *trans* fats. In general, the foods that provide the most *trans* fats in the American diet include cakes, cookies, pies, pastries, French fries, tortilla chips, crackers, popcorn, and stick margarines, as seen on the accompanying *Trans* Fat Table.

The *Trans* Fat Index is simply the amount of industrially-produced *trans* fats that are in your red blood cell membranes. Blood levels of *trans* fats reflect levels in the diet – the more you eat, the higher they are in the blood. Historically, Americans ate too much *trans* fat, but over the last several years the food industry has steadily removed *trans* fats from many products. In fact, since 2009, the average *Trans* Fat Index has decreased by half (from 1.7% to 0.8%). In other words, in 2017 more than half of the samples analyzed have a *Trans* Fat Index of <1%.

Individuals who have been eating typical American diets for decades have relatively high levels of *trans* fatty acids stored in their fat tissue. The more they've eaten (and the more fat tissue they have), the larger the body's total burden of *trans* fats. When a person cuts down on *trans* fat intake, these fatty acids start to slowly "leak" out of the fat tissue and eventually get burned up, but the process is slow. Unfortunately, research on the question of "How slow?" has never been done, so nobody really knows. Consequently, the only way to track the loss of *trans* fats from your body is to periodically test your *Trans* Fat Index every 6 to 12 months.

**Trans* fats are also produced by ruminant bacteria and are present in full-fat dairy products and beef. Blood levels of these types of *trans* fats are not linked to poor heart health and, in fact, may be beneficial. The *Trans* Fat Index does not include this kind of "natural" *trans* fat.

FULL FATTY ACID PROFILE REPORT

NAME: Doe, Jane
DOB: 01/01/1978
ID: JDoe

COLLECTION DATE: 1/3/2020
RESULT DATE: 1/8/2020
PROVIDER: Dr. John Smith

Dried Blood Spot Fatty Acid Profile

| Fatty Acid Group | Total | Percentile Rank | Reference Range* |
|--|---------------|-----------------|--------------------|
| Omega-3 Fatty Acids | 6.82% | 60th | 3.14-18.89% |
| <i>Omega-3 Index</i> | <i>5.87%</i> | <i>60th</i> | <i>2.51-11.79%</i> |
| <i>alpha-Linolenic (C18:3n3)</i> | 0.14% | | |
| <i>Eicosapentaenoic (C20:5n3)</i> | 0.46% | | |
| <i>Docosapentaenoic - n3 (C22:5n3)</i> | 1.68% | | |
| <i>Docosahexaenoic (C22:6n3)</i> | 4.54% | | |
| Omega-6 Fatty Acids | 32.91% | 29th | 25.67-45.65% |
| <i>Linoleic (C18:2n6)</i> | 12.33% | | |
| <i>gamma-Linolenic (C18:3n6)</i> | 0.10% | | |
| <i>Eicosadienoic (C20:2n6)</i> | 0.24% | | |
| <i>Dihomo-g-linolenic (C20:3n6)</i> | 2.07% | | |
| <i>Arachidonic (C20:4n6)</i> | 14.29% | | |
| <i>Docosatetraenoic (C22:4n6)</i> | 2.79% | | |
| <i>Docosapentaenoic - n6 (C22:5n6)</i> | 1.09% | | |
| cis-Monosaturated Fatty Acids | 16.77% | 19th | 14.56-28.79% |
| <i>Palmitoleic (C16:1n7)</i> | 0.63% | | |
| <i>Oleic (C18:1n9)</i> | 15.77% | | |
| <i>Eicosenoic (C20:1n9)</i> | 0.21% | | |
| <i>Nervonic (C24:1n9)</i> | 0.16% | | |
| Saturated Fatty Acids | 42.67% | 56th | 41.45-30.65% |
| <i>Myristic (C14:0)</i> | 0.47% | | |
| <i>Palmitic (C16:0)</i> | 26.07% | | |
| <i>Stearic (C18:0)</i> | 15.07% | | |
| <i>Arachidic (C20:0)</i> | 0.26% | | |
| <i>Behenic (C22:0)</i> | 0.49% | | |
| <i>Lignoceric (C24:0)</i> | 0.30% | | |
| Trans Fatty Acids | 0.54% | 11th | 0.22-4.65% |
| <i>Palmitelaidic (C16:1n7t)</i> | 0.08% | | |
| <i>Elaidic (C18:1t)</i> | 0.16% | | |
| <i>Linoelaidic (C18:2n6t)</i> | 0.31% | | |
| <i>Trans Fat Index</i> | <i>0.47%</i> | <i>9th</i> | <i>0.30-2.42%</i> |
| Ratios | | | |
| AA:EPA | 31:1 | 56th | 1.31-56.8 |
| Omega-6:Omega3 | 5:1 | 23th | 0.85-23.75 |

FULL FATTY ACID PROFILE REPORT

NAME: Doe, Jane
DOB: 01/01/1978
ID: JDoe

COLLECTION DATE: 1/3/2020
RESULT DATE: 1/8/2020
PROVIDER: Dr. John Smith

Omega-3 Fatty Acids

The four omega-3 fatty acids reported here include the “plant” omega-3 (alpha-linolenic acid, ALA) and the three “fish” omega-3s (EPA, DHA and DPA n-3). ALA is one of the two essential fatty acids in the diet, meaning, like a vitamin, we cannot make it and have to get it from our diet. According to the *Dietary Guidelines for Americans*, an adequate intake of ALA is about 1.5 grams per day, which is about the average intake in the US today. ALA comes primarily from soybean oil (which is a component of many processed foods), but certain specialty foods/oils are particularly rich sources (chiasseed oil, flaxseed oil, black walnuts). With respect to the “fish” omega-3’s, they are not technically essential fatty acids, but they may help to maintain heart, brain, eye and joint health. Recommendations for EPA+DHA intakes are given in the Omega-3 Index report. Although a desirable range for the Omega-3 Index has been set at 8%-12%, at present, there is not enough research to recommend a target blood levels for ALA (or DPA n3).

Omega-6 Fatty Acids

We measure levels of seven fatty acids in the omega-6 family, but on average 85% of the total amount comes from only two – linoleic and arachidonic acids. The former is (like ALA) an essential fatty acid and is the starting material for the synthesis of the other omega-6s, including arachidonic acid. The level of linoleic acid in your blood is generally influenced by the amount you eat over many months, whereas the level of arachidonic acid (and the other five omega-6 fatty acids) are primarily determined by your body’s metabolism. In other words, there is little you can do from a dietary perspective to alter the levels of six of the seven omega-6 fatty acids. Making significant changes in linoleic acid blood levels via diet takes months to years. The *Dietary Guidelines for Americans* defines an adequate intake of linoleic acid as 11-14 grams per day for women and 14-16 grams per day for men.

There has been considerable controversy regarding whether omega-6 fatty acids, linoleic acid in particular, are “good” or “bad” for our health. Some researchers link higher inflammation in the body, which is a part of many chronic disease processes, to higher intake of omega-6 fatty acids because arachidonic acid is the starting material for the production of some “pro-inflammatory” molecules. Others disagree, noting that in most studies, higher amounts of linoleic acid in the diet or in the blood are associated with better overall heart and metabolic health. In fact, linoleic acid levels between about 25% and 28% are associated with better health than lower levels. Despite this evidence, there continues to be a controversy in this area. Nevertheless, the recommendation of the American Heart Association is that between 5% and 10% of calories be consumed as linoleic acid (current US intakes average about 6% of calories). Clearly, further research is needed in this area.

cis-Monounsaturated Fatty Acids

There are four fatty acids in this class, but 95% of “monos” are from one fatty acid, oleic acid. Oleic acid is in many vegetable oils, especially olive oil, so it is a part of virtually everyone’s diet and also is made by our body (not an essential fatty acid). Although found in relatively high amounts in the blood of people on a Mediterranean Diet (due to the large intake of olive oil), the relationship between blood oleic acid levels and health is somewhat controversial. We cannot provide a strong, research-based recommendation for a desirable blood oleic acid range or corresponding dietary advice to change levels. Because oleic acid levels come from both what you eat and what your body makes, it’s very hard to change blood levels. At present, oleic acid levels are provided in the report for the sake of completeness, not to guide recommendations for dietary changes.

FULL FATTY ACID PROFILE REPORT

NAME: Doe, Jane
DOB: 01/01/1978
ID: JDoe

COLLECTION DATE: 1/3/2020
RESULT DATE: 1/8/2020
PROVIDER: Dr. John Smith

***cis*-Monounsaturated Fatty Acids Continued**

The only other fatty acid in this family that merits comment is palmitoleic acid. It is normally present at only about 1% of total fatty acids in your blood (as opposed to about 20% for oleic acid), but it is being recognized as a marker of excess carbohydrates in the diet. Foods rich in simple carbohydrates are sugar, flour, high-fructose corn syrup, etc. Too much of these kinds of carbohydrates causes the body to actually make fatty acids, which is why palmitoleic acid levels go up in this setting. Again, the research in this field is immature and does not allow for firm target values to be set, but levels below about 0.6% are probably better than higher levels. (Note: if you are taking a palmitoleic acid supplement, the relationship between carbohydrate intake and blood levels of this fatty acid become complex and hard to interpret.)

Saturated Fatty Acids

There are six saturated fatty acids in the Report. Foods rich in saturated fatty acids are usually solids at room temperatures, which includes foods like butter, shortening, and lard. (Oils rich in unsaturated fatty acids, like vegetable or fish oils, are liquids). As with the other classes described above, the vast majority of saturated fatty acids are from two fatty acids: palmitic and stearic acid. Together they make up ~98% of the saturated fatty acids in the blood, with palmitic making up 2/3rds of the total. Stearic acid does not appear to have any important health implications, but higher levels of palmitic may. Lower levels of palmitic acid in the blood seem to be linked with better overall health. So, keeping palmitic acid levels below “average” (i.e., less than about 21%,) would probably be wise although firm evidence for this has yet to be produced. Again, palmitic acid is both consumed and made by the body, especially when carbohydrate intake is high, so it is difficult to make dietary change recommendations based just on blood levels. Lowering both saturated fat and simple carbohydrate intake (which is generally recommended as a part of a healthy diet), should result in lower palmitic acid blood levels.

- a. Reference Ranges encompass about 99% of US adults. Visit our FAQ section for more information.
- b. Desirable Ranges are only set for the fatty acids where the research has shown health benefits which has been able to be repeated in multiple studies.