

FATTY ACIDS		RESULTS	SOURCE
Polyunsaturated Omega-3 Fatty Acids		1.5% L (Ref. Range 2.1 – 12.5)	
Alpha-Linolenic Acid*	C18:3n-3	0.4%	Walnuts, flaxseeds, pumpkin seeds, chia seeds and hemp as well as walnut and flaxseed oils.
Eicosapentaenoic Acid*	C20:5n-3	BDL	Fatty fish such as salmon, mackerel and sardines, shellfish such as oysters, crabs, prawns and marine algae.
Docosapentaenoic Acid*	C22:5n-3	0.3%	Fatty fish such as salmon, mackerel, sardines and barramundi, liver of white fish and marine algae.
Docosahexaenoic Acid*	C22:6n-3	0.8%	Fatty fish such as salmon, mackerel and sardines, shellfish such as oysters, crab, prawns and marine algae. Cow and sheep brains.
Polyunsaturated Omega-6 Fatty Acids		41.9% H (Ref. Range 23.5 – 40.0)	
Linoleic Acid*	C18:2n-6	29.5%	Canola, sunflower, corn, soybean and peanut oils. Margarine made from these oils.
Gamma-Linolenic Acid*	C18:3n-6	0.3%	Evening primrose, blackcurrant, borage (starflower) and hemp oil.
Eicosadienoic Acid	C20:2n-6	BDL	Microalgae, trace amounts in animal tissues; synthesised from Linoleic Acid (LA)
Dihomo-Gamma-Linolenic Acid*	C20:3n-6	0.5%	Synthesised in the body from Linoleic Acid (LA); DGLA production enhanced with high levels of Alpha-Linolenic Acid (ALA).
Arachidonic Acid*	C20:4n-6	9.8%	Grain-fed meat and eggs from grain-fed chicken. AA is synthesised from linoleic acid (LA) in the body.
Adrenic Acid	C22:4n-6	1.8%	Kielbasa (meat sausage), turkey, chicken and pork.
cis-Monounsaturated Fatty Acids		15.2% (Ref. Range 15.0 – 26.0)	
Palmitoleic Acid*	C16:1n-7	0.1%	Macadamia nuts and buckthorn oils.
Oleic Acid*	C18:1n-9	14.3%	Avocados, olives, peanuts, macadamia nuts, sesame seeds, poppyseeds and their oils, as well as animal fats.
Eicosenoic Acid	C20:1n-9	0.3%	Plant oils especially jojoba oil, nuts, garlic and mung beans.
Nervonic Acid	C24:1n-9	BDL	Seed oil of all plants especially prevalent in Lunaria species and yeast.
Erucic Acid	C22:1n-9	0.2%	Rapeseed and mustard seed oils.
Vaccenic Acid	C18:1n-7	0.3%	Dairy fat from cows and goats.


*BDL: Below Detection Limit

FATTY ACIDS	RESULTS	SOURCE
Saturated Fatty Acids		39.8% (Ref. Range 27.3 – 40.0)
Myristic Acid*	C14:0	0.5% Nutmeg, coconut and palm oils.
Pentadecanoic Acid	C15:0	0.1% Dairy fat from cows, durian fruit.
Palmitic Acid*	C16:0	22.1% Palm oil, meat and dairy fats.
Margaric Acid	C17:0	1.2% Occurs as a trace component of the fat and milk fat of ruminants (such as goats and cows), durian fruit.
Stearic Acid*	C18:0	14.1% Nuts, seeds, pork, potato/corn & other chips, salad dressings, soups, crackers, white potatoes.
Arachidic Acid	C20:0	0.6% Peanut oil
Behenic Acid	C22:0	1.1% Peanut and moringa oil, opium poppy, tamarind, and black elderberry. It has low bioavailability but is cholesterol-raising.
Lignoceric Acid	C24:0	0.1% Low levels are present in most natural fats and peanut oil.
Trans Fatty Acids		1.4%
Trans Oleic Acid	C18:1t	*BDL Dairy products, industrially produced trans fatty acids
Trans Linoleic Acid	C18:2n-6t	*BDL Industrially produced trans fatty acids
Dimethyl Acetal Palmitic Acid	dmaC16:0	0.9% Hydrogenated vegetable fats, metabolite from gut bacteria.
Trans-Palmitoleic Acid	C16:1n-7t	0.4% Hydrogenated vegetable fats, metabolism of dietary vaccenic acid.
Dimethyl Acetal Stearic Acid	dmaC18:0	*BDL Metabolite from gut bacteria
Trans-Vaccenic Acid	C18:1n-7t	0.1% Fat of cattle and sheep, dairy products


*BDL: Below Detection Limit

It is recommended to measure fatty acid levels every 6 months.

NOTE - Above results relate only to the sample as received.
 - The results should be clinically correlated.
 - Fatty Acids marked with * are accredited by NABL.
 - The sources above are not a comprehensive list and additional sources of individual fatty acids may be applicable


 Analysed by:
 Mrityunjay Singh, Dy. Technical Manager



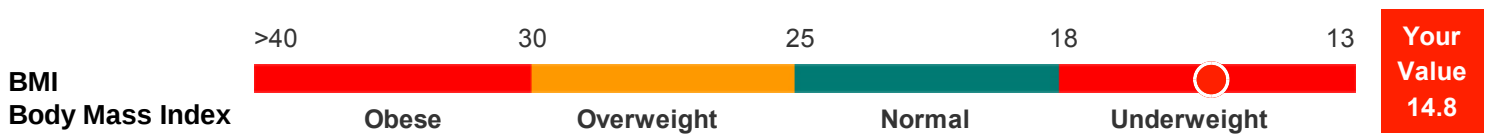

 Approved signatory:
 Dr. Kuldeep Kumar Ravivanshi, Technical Manager

PATIENTS PROFILE

The indicators in this test report are novel biomarkers and are the focus of intense research exploring their potential in preventive medicine. These can be used by your healthcare provider to design and provide effective personalized dietary and supplementation guidance. Besides the fatty acids used in biomarkers, the other fatty acids are provided primarily for your information only.

How to interpret the biomarkers:

- If results fall in the red or yellow area, a change in diet might be beneficial.
- If results lie within the green area, current dietary habits are balanced and should be maintained to positively influence life style related health issues.



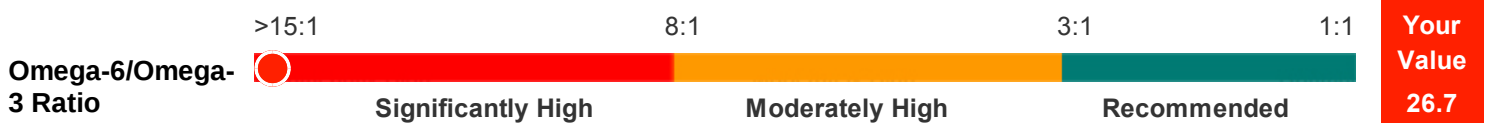
You are in the underweight range which may relate to nutritional deficiency diseases.

The Body Mass Index (BMI) is a general health index that measures body fat based on your height and weight and applies to most adult men and women aged 20 and above. The higher your BMI, the higher the amount of fat in your body. People with a BMI outside of the recommended green area are recommended to seek advice from a doctor or an authorised nutritionist or a dietician to develop a personalised dietary plan for healthy weight management.



Your Omega-3 Index is in the deficient range. Include more fish such as salmon, mackerel, herring etc. in your diet. Alternatively, you can consume Omega-3 supplements.

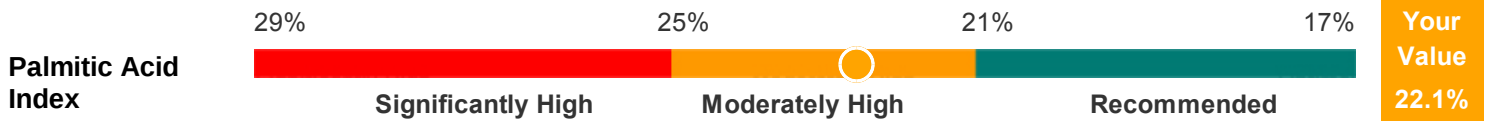
The Omega-3 Index reflects the relative the amount of Eicosapentaenoic acid (EPA) and Docosahexaenoic acid (DHA) levels in red blood cell membranes. The recommended levels of Omega-3 Index in your should be above 8%.¹ Recent scientific studies strongly suggest that an Omega-3 index of greater than 8% is correlated with increased insulin sensitivity and a reduced risk of developing cardiovascular disease.²



Your Omega-6/Omega-3 ratio is significantly high. Increase intake of foods rich in Omega-3 fats such as fatty fish or include high quality Omega-3 supplements in diet.

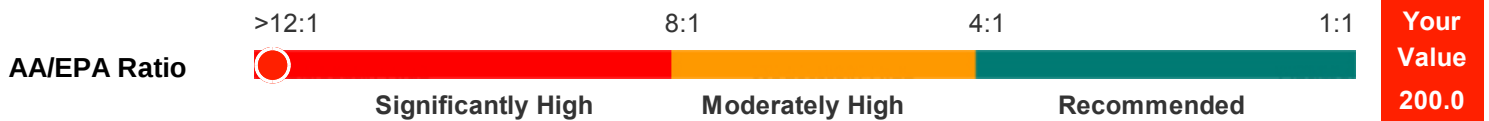
The ratio of Omega-6 to Omega-3 reflects the composition of polyunsaturated fatty acids (PUFAs) in your diet. The recommended optimal Omega-6 to Omega-3 ratio is less than 3:1.³ An unbalanced Omega-6 to Omega-3 ratio is known to be a leading cause for chronic and lifestyle diseases such as general allergies, skin problems, muscle and joint problems, that may develop undetected over time. Therefore, reducing the Omega-6 to Omega-3 ratio by using a combination of dietary supplements and dietary changes will promote optimal health. When changing your diet, it is recommended to decrease the intake of Omega-6 fatty acids. Food products containing grains and edible oils like soybean-, sunflower- and corn oils are rich sources of Omega-6 fatty acids.

PATIENTS PROFILE



Your palmitic acid index is moderately high. Reduce the intake of palm oil, palm oil based products, sugar and carbohydrate rich food.

The Palmitic acid (PA) index measures the level of Palmitic acid in your blood. It has been reported that level of PA in blood is related to HbA1c (glycated hemoglobin), a known marker for identifying average plasma glucose concentration.⁴ Carbohydrates serve as the primary energy source for functioning of the body help it use fat more efficiently. The liver and muscles can store around 500 grams of total carbohydrate as glycogen and the rest, excess carbohydrates are converted to Palmitic acid (PA), a long chain saturated fatty acid, to be stored in fat cells in fat tissues. Excess dietary carbohydrates and sugar are a known risk factor in diabetes II, obesity and metabolic syndrome. The ingredient- and nutrition list on labels of all food products provide information about sugar and carbohydrate content in the food product.



Your inflammatory indicator is in the optimal range. Maintain current diet and/or Omega-3 supplement intake. If recently commencing supplements a repeat test in 3-6 months may be warranted to assess if dose should be adjusted to achieve desired range.

AA/EPA ratio is a measure of diet induced chronic inflammation. Eicosapentaenoic acid (EPA) is a key anti-inflammatory long-chain polyunsaturated omega-3 fatty acid, while the omega-6 fatty acid, Arachidonic acid (AA) is a precursor to a number of pro-inflammatory mediators. EPA acts competitively with AA for the key cyclooxygenase (COX) and lipoxygenase (LOX) enzymes to form less inflammatory products. As a result, the AA/EPA ratio may be a marker of chronic inflammation, with a higher ratio corresponding to higher levels of inflammation. High levels of AA/EPA ratio are a reliable and independent marker of Cardiovascular risk.⁵



Your Trans Fat Index is in the recommended region.

Trans-Fat Index (TFI) represents the relative abundance of Trans Oleic (19:1t)-and-Trans Linoleic (18:2n6t) fatty acids in the RBC membranes. The two main sources of the undesirable trans-fatty acids or trans-fats in our diet are: (1) industrially produced partially hydrogenated vegetable (PHV) fats used in cooking, and baked and processed foods, (2) Dairy and meat from ruminants (cows and goats). As intake of ruminant trans-fats in dairy and meat are very low, the two trans-fatty acids comprising the TFI are majorly found in the first category, ie. baked and processed foods.

Partially hydrogenated vegetable fats contain trans-fats and are considered a dietary risk for all major non-communicable diseases and linked to half a million deaths worldwide.⁶ Trans-fats are associated with systemic inflammation, endothelial dysfunction, and increased risk of type-2 diabetes.⁷ According to World Health Organization (WHO), those with a high intake of trans-fats have a 34% increased risk of death from any cause, 28% increased risk from deaths related to coronary heart disease and 21% increased risk of developing coronary heart disease.⁷⁻⁸ Taking cognizance of the overall harmful effects of trans-fats, the WHO has recommended to remove trans-fats from the global food supplies by 2023.⁸

Measuring blood trans-fats and the TFI is a direct and reliable method to quantify the intake of trans-fats. It is recommended that those who have a higher than recommended TFI consult their healthcare provider to make appropriate changes to their diet and re-test after a period of 4 months.

Test Results

The results shows that your fatty acid profile is: **UNBALANCED**

It is recommended that you take 1g Omega-3 daily for a period of 4 months to improve your bioavailability of Omega-3 (EPA+DHA). This will help reduce the Omega-6 to Omega-3 ratio and decrease the dietary inflammation (AA/EPA). You should also consider changing your diet to one with less Omega-6 by reducing daily intake of plant oils and grains. Reducing your intake of sugar and carbohydrates will also bring your Palmitic acid index within the desired range.

A new OMEGA HealthTest may be repeated after this period which will indicate improvements that may lead to reduced recommended dosage.

Types of Fats

Saturated fats are non-essential fats that come from animal products such as beef, lamb, pork, poultry with skin, butter, cream, cheese and other dairy products. Foods from plants that contain saturated fats include coconut, coconut oil, palm oil and palm kernel oil and cocoa butter. The American Heart Association recommends minimizing saturated fat consumption because of links to high cholesterol and an increased risk of cardiovascular disease.

Monounsaturated fats (MUFA) are non-essential fats that are generally considered to be of a good fat type. They are considered to be healthier alternatives to saturated and refined trans-fats found in most processed foods. Olive oil, avocados and almonds are good sources of MUFAs. The American Heart Association recommends replacing the majority of your saturated fat intake with monounsaturated fat or polyunsaturated fats.

Omega-6 is a family of essential polyunsaturated fatty acids (PUFA) that must come from the diet. Modern diets contain a high proportion of omega-6 fatty acids, especially Linoleic acid, an essential fatty acid from common vegetable oils (e.g. corn, soya, sunflower, and cottonseed), processed foods made with them, as well as from seeds, nuts (eg. Cashews and Pecans) and grains (eg. cereals, wheat flour, pastas etc.). Arachidonic acid (AA) accumulates in meats from grain-fed animals and poultry. These fatty acids are pro-inflammatory and their consumption should be under control.

Omega-3 is a family of essential PUFAs that must come from the diet. Alpha-Linolenic acid (ALA) originates from vegetable fats, while both Eicosapentaenoic acid (EPA) and Docosahexaenoic acid (DHA) are rich in fatty shellfish and fish like Salmon, Anchovies, Herring, Sardines, and Trout. Plant derived ALA is not efficiently converted by our body into the required longer chain fatty acids EPA and DHA, which must come from marine sources or fish-oil based supplements. An adequate supply of EPA and DHA in your diet is crucial to the development and function of the nervous system.

References

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³Simopoulos, AP., "Essential Fatty Acids in Health and Chronic Diseases", *Am J Clin Nutr* 1999;70 (suppl):560S-9S.

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⁵S Nelson, J.R., and Rashin, S., "The eicosapentaenoic acid: arachidonic acid ratio and its clinical utility in cardiovascular disease", *Postgraduate Medicine*, 4 (131), 2019.

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⁷Sun, Qi., et al., "A prospective study of trans fatty acids in erythrocytes and Risk of coronary heart disease", *Circulation*, 115:1858-1865, 2007.

⁸ <https://www.who.int/news-room/q-a-detail/nutrition-trans-fat>