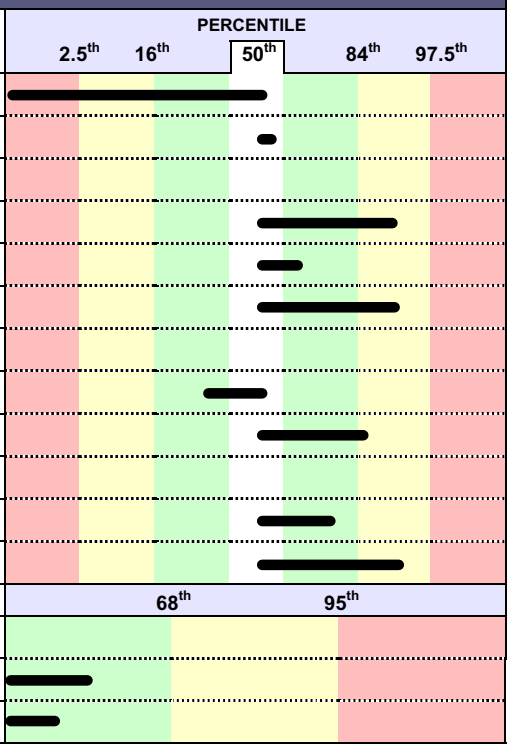
LAB #: Sample Report
PATIENT: Sample Patient
ID:
SEX: Female
AGE: 64

CLIENT #: 12345
DOCTOR: Sample Doctor
Doctor's Data, Inc.
3755 Illinois Ave.
St. Charles, IL 60174 U.S.A.

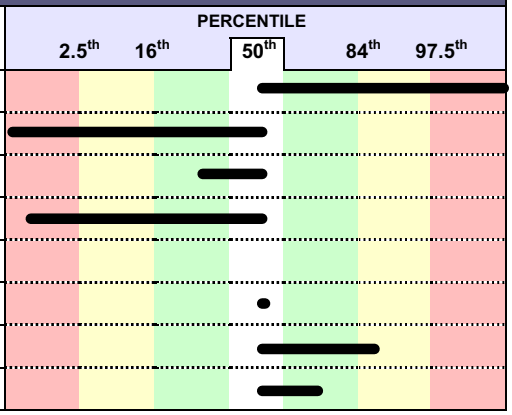
Fatty Acids; Erythrocytes

OMEGA 3 FATTY ACIDS	RESULT %/TOTAL	REFERENCE INTERVAL
Eicosapentaenoic (EPA) 20:5ω3	**0.4**	0.5 - 5
Docosahexanoic (DHA) 22:6ω3	**5.1**	3 - 8
OMEGA 6 FATTY ACIDS		
Linoleic 18:2ω6	**14**	7 - 15
Dihomo-γ-linolenic (DGLA) 20:3ω6	**2.3**	1.2 - 4
Arachidonic (AA) 20:4ω6	**19**	11 - 20
MONOUNSATURATED FATTY ACIDS		
Oleic 18:1ω9	**15**	12 - 20
Palmitoleic 16:1ω7	**0.43**	0.12 - 0.65
SATURATED FATTY ACIDS		
Palmitic 16:0	**25**	17 - 28
Stearic 18:0	**19**	14 - 20
TRANSISOMER FATTY ACIDS		
Palmitelaidic 16:1ω7t	**0.012**	< 0.05
Elaidic 18:1ω9t	**0.1**	< 0.4



RATIOS

OMEGA 3 AND OMEGA 6 RATIOS	RESULT	REFERENCE INTERVAL
AA/EPA	**47**	2 - 28
EPA/DHA	**0.08**	0.14 - 1.2
AA/DGLA	**8.1**	5 - 14
EPA/DGLA	**0.2**	0.2 - 1.6
DESATURASE ENZYME MARKERS		
Linoleic/DGLA (Δ6)	**6.1**	2.5 - 10
Stearic/Oleic (Δ9)	**1.29**	0.8 - 1.4
DGLA/AA (Δ5)	**0.12**	0.065 - 0.16



FATTY ACID DISTRIBUTION

	TOTAL	OMEGA 3	OMEGA 6	MONO	SATURATED	TRANS
Patient Distribution	**4310** µmol/L	**6** %	**35** %	**15** %	**44** %	**0.1** %
Average Distribution	**5200** µmol/L	**9** %	**29** %	**18** %	**44** %	**0.3** %

SPECIMEN DATA

Comments:
Date Collected: **02/05/2019**
Date Received: **02/06/2019** <dl: **less than detection limit**
Date Completed: **02/15/2019**
Method: **Gas Chromatography (GC)**

v07.10

Erythrocyte Fatty Acids

This test measures the fatty acids (FAs) that are present as constituents of phospholipids in the membranes of erythrocytes (red blood cells). Each specific FA is reported as a percentage of total FAs measured. FAs are carboxylic acids that may be either unsaturated (one or more carbon-to-carbon double bonds) or saturated (no carbon-to-carbon double bonds). FAs may come from natural or synthetic sources. There are two families of essential FAs (EFAs), omega-3 and omega-6, all of which are poly-unsaturated FAs (PUFAs) meaning that they all have more than one C=C double bond.

FAs derived from the EFAs (or taken in via diet or supplements) are essential components of all cell membranes and appropriate membrane fatty acid content is pivotal for optimal membrane fluidity and cellular metabolism. The same FAs eventually give rise to hormone-like substances that are involved in the regulation of blood pressure, blood coagulation, lipid levels, immune response, tumor growth and inhibition, the inflammatory response to injury and infection, and may play a role in seizure disorders and dementias such as Alzheimer's disease. Fatty acid metabolism is very dynamic and proper balance among essential and non-essential FAs, as well as avoidance of harmful trans-FAs, is required for optimal health and wellness.

The American Heart Association's Nutrition Committee strongly advises these fat guidelines for healthy Americans over age 2:
- Limit total fat intake to less than 25-35 percent of your total calories each day; limit saturated fat intake to less than 7 percent of total daily calories
- Limit trans-fat intake to less than 1 percent (trace) of total daily calories; the remaining fat should come from sources of monounsaturated and polyunsaturated fats such as nuts, seeds, fish and vegetable oils
- Limit cholesterol intake to less than 300 mg per day, for most people. If you have coronary heart disease or your LDL cholesterol level is 100 mg/dL or greater, limit your cholesterol intake to less than 200 mg a day.
- Example: a sedentary female who is 31-50 years old needs about 2,000 calories each day. Therefore, she should consume less than 16 g saturated fat, less than 2 g trans- fat and between 50 and 70 grams of total fat each day (with most fats coming from sources of polyunsaturated and monounsaturated fats, such as fish, nuts, seeds and vegetable oils).

Eicosapentaenoic Acid Lower Than Expected

Eicosapentaenoic acid (EPA) is lower than expected in this sample.

EPA is an omega-3, 20 carbon PUFA with 5 C=C double bonds (20:5). EPA is a precursor for docosahexaenoic acid (DHA). Humans can convert alpha-linolenic acid (ALA) to EPA but this is a slow process - EPA is better obtained directly from foods and dietary supplements. Women have a higher ALA to EPA conversion efficiency than men, perhaps because women use less dietary ALA for beta-oxidation than do men. EPA may be beneficial in the prevention of heart disease.

Significance:
- Diabetics may have limited ability to make EPA from ALA
- Numerous anti-inflammatory activities

- May be beneficial in management of schizophrenia
- May be of use in preventing major coronary events in patients with high cholesterol
- May reduce the risk of developing certain types of cancer
- May improve the response to chemotherapy
- May be useful in reducing the number and size of precancerous bowel polyps in people at risk of developing bowel cancer (may work as well as celocoxib)

Sources of EPA include:
- Cold water oily fish or fish oil (fish do not manufacture EPA directly - they acquire it from the algae that they consume)
- Found in breast milk
- Produced commercially from microalgae culture

Dosages:
- Doses may vary; some examples are given below
- Depression 1gram EPA bid;
- Borderline personality disorder 1 gram ethyl-EPA qd for up to 8 weeks;
- Menopausal symptoms such as hot flashes 500 mg ethyl-EPA tid for up to 8 weeks

Dosage Precautions:
- Potential adverse effects such as nausea, diarrhea, heartburn, skin rash, itching, nosebleeds, joint pain and muscle pain
- May lower blood pressure - use with caution with blood pressure lowering drugs
- Use caution when taking drugs that can impair blood clotting such as warfarin and/or non-steroidal anti-inflammatory drugs (NSAIDs) such as aspirin, ibuprofen
- Use with caution when supplementing with garlic, Vitamin E and quercetin as these can impair blood clotting as well
- Do not use if pregnant or breast feeding.

EPA/DHA Ratio Lower Than Expected

The EPA/DHA ratio is lower than expected in this sample. Check the individual results for EPA and DHA to determine why the ratio is low.

Both EPA and DHA are omega-3 FAs that can be bio-converted from the essential FA alpha-linolenic acid. However the bio-conversion process is inefficient and direct intake of EPA and DHA rich oils (e.g. fish oil) is a much more efficient way to restore the omega-3 FA content of membrane phospholipids. Retro conversion of DHA to EPA does occur but is inefficient; only about 10-12% when pure DHA is provided in the diet. DHA may be more important than EPA, especially in brain development (e.g. fetus and infants) and function (memory, concentration, attention, mood, etc).

No consensus in the literature as to the ”best” EPA / DHA ratio in foods and supplements. However, depending on the clinical presentation of the patient and, in light of the ratio reported for this patient, consider the following supplemental doses of DHA or DHA+EPA as recommended by the International Society for the Study of Fatty Acids and Lipids (ISSFAL)
- Pregnant and lactating women 300 DHA (only DHA - no EPA) mg per day
- Infants 1 to 18 months - 14.5 mg/kg (32 mg/lb) DHA+EPA
- Children 18 months to 15 years - 6.8 mg/kg (15 mg/lb) DHA+EPA

- Adults - 500 mg DHA+EPA (minimum 220 mg DHA plus minimum 220 mg EPA)
- Adults with high triglycerides should take 2 to 4 grams of DHA plus EPA daily (American Heart Association recommendation).

AA/EPA Ratio Higher Than Expected

The AA/EPA ratio in this sample is higher than expected. This means that there is an undesirable preponderance of omega-6 to omega-3 fatty acids. Synthesis of omega-3 FAs is competitively inhibited by the presence of their omega-6 analogues. Therefore omega-3 FAs can be incorporated into membranes more effectively when they are obtained directly from dietary sources or from supplementation, rather than relying solely on in vivo synthesis.

- High AA/EPA ratios are common in diets high in meat and corn oil - balance with (c)-3 fatty acids (e.g. fish oils)
-Lowering the ratio in inflammatory conditions may be of benefit (reduced availability of AA for pro-inflammatory eicosenoid production)
- Supplementation of omega-3 fatty acids (e.g. EPA) significantly reduces AA to EPA ratios; reduces triglyceride levels in healthy subjects but may not have a similar effect in subjects with CAD
- A high ratio may be associated with clinical symptoms of depression
- Children with ADHD appear to have higher AA to EPA ratios compared to normal controls. Lowering the ratio using purified fish oil high in EPA and DHA (omega-3 fatty acids) may improve symptoms of children with ADHD

EPA/DGLA Ratio Lower Than Expected

The EPA/DGLA ratio in this sample is lower than expected. This means that there is a preponderance of DGLA present in the sample. This ratio is low when DGLA is high relative to EPA (need for EPA sources such as fish oils). High DGLA, and thus high series 1 eicosanoids, can be promoters of tumor growth. Check the individual levels of EPA and DGLA to determine whether the omega-3 or omega-6 FA intake might require attention.