

Patient: **SAMPLE**
PATIENT

DOB:

Sex:

MRN:

3100 ION® Profile - Blood / Urine

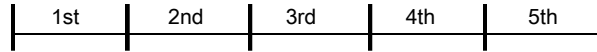
Amino Acids 20 Profile - Plasma

Methodology: High Performance Liquid Chromatography

Ranges: Ages 13 and over.

Results
µmol/L

QUINTILE DISTRIBUTION



95% Reference
Range

Essential Amino Acids

Limiting Amino Acids

Rank	Amino Acid	Result (µmol/L)	Quintile Distribution	95% Reference Range
1.	Lysine	100	117 - 203	99 - 234
2.	Methionine	14	16 - 26	14 - 30
3.	Tryptophan	25 L	35 - 59	30 - 67

Branched Chain Amino Acids

4.	Isoleucine	30 L	40 - 72	33 - 89
5.	Leucine	57 L	80 - 137	68 - 161
6.	Valine	159	143 - 240	123 - 282

Other Essential Amino Acids

7.	Phenylalanine	42	43 - 64	39 - 74
8.	Histidine	62	48 - 72	41 - 82
9.	Threonine	100	76 - 151	63 - 181

Conditionally Essential Amino Acids

10.	Arginine	69	48 - 96	37 - 114
11.	Taurine	89	31 - 73	26 - 100
12.	Glycine	474 H	162 - 348	136 - 430
13.	Serine	94	66 - 115	57 - 133



Amino Acids 20 Profile - Plasma

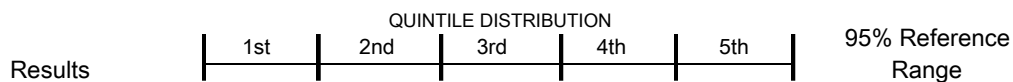
Methodology: High Performance Liquid Chromatography

Ranges: Ages 13 and over.

Results μmol/L	QUINTILE DISTRIBUTION					95% Reference Range
	1st	2nd	3rd	4th	5th	
Functional Categories						
Vascular Function						
14. Arginine	69					37 - 114
15. Taurine	89					26 - 100
Neurotransmitters and Precursors						
16. Phenylalanine	42					39 - 74
17. Tyrosine	30					29 - 80
18. Tryptophan	25	L				30 - 67
19. Glutamic Acid	180	H				23 - 136
20. Taurine	89					26 - 100
Sulfur Amino Acids (Glutathione - related)						
21. Methionine	14					14 - 30
22. Taurine	89					26 - 100
Urea Cycle and Ammonia Detoxification						
23. Arginine	69					37 - 114
24. Citrulline	48	H				15 - 44
25. Ornithine	45					23 - 109
26. Glutamine	339					338 - 630
27. Asparagine	25	L				26 - 56
28. Aspartic Acid	13.1	H				4.2 - 12.5
Ratios						
29. Phenylalanine/Tyrosine	1.40					<= 1.44
30. Glutamic Acid/Glutamine	0.53	H				0.05 - 0.35
31. Tryptophan/LNAA*	0.079	L				0.095 - 0.106

*Large neutral amino acids (Leu+Ile+Val+Phe+Tyr)

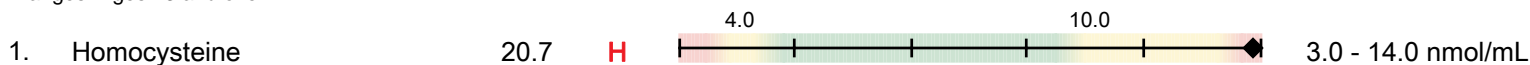
NR = Not Reportable



Homocysteine Assay - Plasma

Methodology: Enzymatic Assay

Ranges: Ages 13 and over.

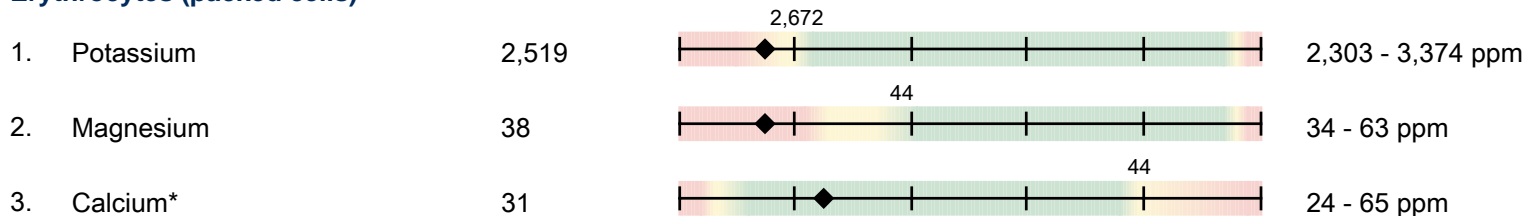


Nutrient & Toxic Elements Profile - Blood

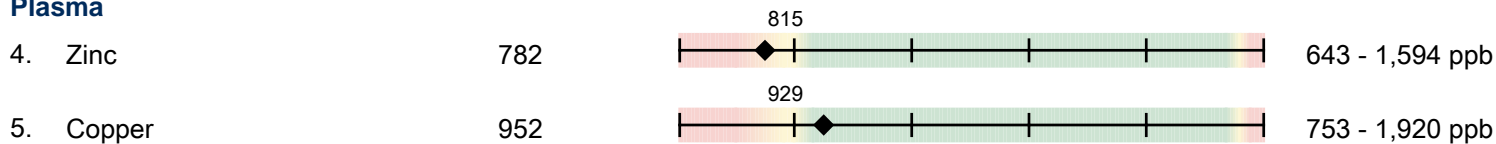
Methodology: Inductively Coupled Plasma/Mass Spectrometry

Nutrient Elements

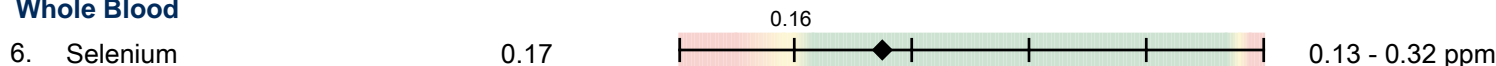
Erythrocytes (packed cells)



Plasma

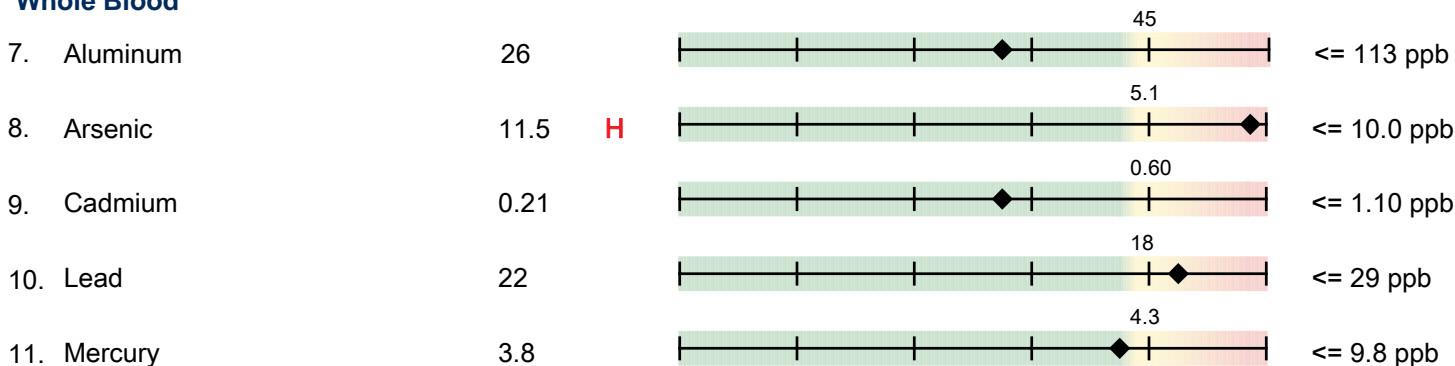


Whole Blood



Toxic Elements

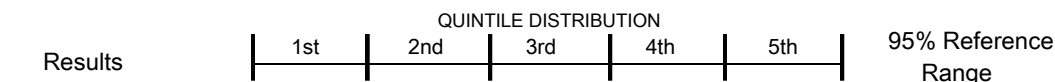
Whole Blood



*Relevant to membrane permeability, not nutritional status.

Results for whole blood toxic elements that are within normal limits do not rule out metal accumulation in other tissues.

NR = Not Reportable



Coenzyme Q10 Plus Vitamins Profile - Serum

Methodology: High Performance Liquid Chromatography

Ranges: Ages 13 and over.

	Results mg/L		QUINTILE DISTRIBUTION	95% Reference Range
1.	Coenzyme Q10	2.73		0.48 - 3.04
2.	alpha-Tocopherol	42.6	H	6.8 - 31.7
3.	gamma-Tocopherol	2.19		0.06 - 2.99
4.	Vitamin A (Retinol)	1.39	H	0.29 - 1.05
5.	β-Carotene	0.47		0.10 - 2.71

Lipid Peroxides Assay - Serum

Methodology: High Performance Liquid Chromatography

	Results nmol/mL		QUINTILE DISTRIBUTION	95% Reference Range
6.	Lipid Peroxides	1.47		<= 2.60

DNA/Oxidative Stress Marker (8-OHdG) Assay - Urine

Methodology: LC/Tandem Mass Spectrometry, Colorimetric

Ranges: Ages 13 and over.

	Results ng/mg creatinine		QUINTILE DISTRIBUTION	95% Reference Range
7.	8-Hydroxy-2-deoxyguanosine	4.9		<= 7.6

Vitamin D Profile - Serum

Methodology: Chemiluminescent

	Results ng/mL	Reference Range	
8.	25-Hydroxyvitamin D ♦	57	30 - 100 ng/mL

- Deficiency: <20 ng/mL
- Insufficiency: 20-29 ng/mL
- Sufficient: 30-100 ng/mL
- Recommended: 50-80 ng/mL
- Excessive: >100 ng/mL

There is no consensus in the literature regarding optimal levels of 25-Hydroxyvitamin D. Higher levels of 25-Hydroxyvitamin D may be concerning in patients with renal failure. Levels below 30 ng/mL are considered insufficient by most medical associations.

Holick MF, et al. *J Clin Endocrinol Metab.* 2011;96(7):1911-1930.

Vitamin D Council: <https://www.vitaminCouncil.org/>

<DL = less than detection limit

NR = Not Reportable

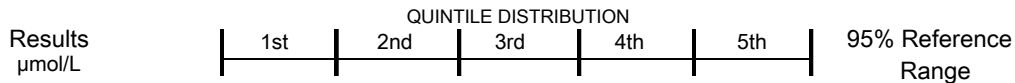
25-Hydroxyvitamin D testing performed by Genova Diagnostics, Inc. 63 Zillicoa St., Asheville, NC 28801-0174. A. L. Peace-Brewer, PhD, D(ABMLI), Lab Director - CLIA Lic. #34D0655571 - Medicare Lic. #34-8475.



Fatty Acids Profile - Plasma

Methodology: Capillary Gas Chromatography/Mass Spectrometry

Ranges: Ages 13 and over



Polyunsaturated Omega-3

Results $\mu\text{mol/L}$	1st	2nd	3rd	4th	5th	95% Reference Range
1. Alpha Linolenic (18:3n3)	25	20				13 - 80
2. Eicosapentaenoic (20:5n3)	29	17				5 - 210
3. Docosapentaenoic (22:5n3)	21	16				11 - 50
4. Docosahexaenoic (22:6n3)	110	59				31 - 213

Polyunsaturated Omega-6

5. Linoleic (18:2n6)	1,275	930			1,669	821 - 2,032
6. Gamma Linolenic (18:3n6)	5	7			33	5 - 46
7. Eicosadienoic (20:2n6)	12.3	6.4			15.3	5.2 - 22.5
8. Dihomogamma Linolenic (20:3n6)	39	34			102	27 - 140
9. Arachidonic (20:4n6)	299	201			451	158 - 521
10. Docosadienoic (22:2n6)	0.8				0.9	≤ 2.0
11. Docosatetraenoic (22:4n6)	5.3	3.7			13.8	2.6 - 18.1

Polyunsaturated Omega-9

12. Mead (20:3n9)	2.3				5.3	≤ 8.3
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Monounsaturated

13. Myristoleic (14:1n5)	1.9	1.2			6.1	0.8 - 9.7
14. Palmitoleic (16:1n7)	52	40			155	30 - 256
15. Vaccenic (18:1n7)	71	48			93	40 - 122
16. Oleic (18:1n9)	1,058	555			1,182	466 - 1,470
17. 11-Eicosenoic (20:1n9)	7.6	4.6			10.3	3.7 - 18.1
18. Nervonic (24:1n9)	1.9	1.1			2.2	1.1 - 2.7



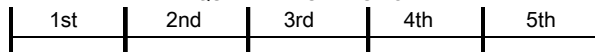
Fatty Acid Profile - Plasma

Methodology: Capillary Gas Chromatography/Mass Spectrometry

Ranges: Ages 13 and over

Results
μmol/L

QUINTILE DISTRIBUTION



95% Reference
Range

Saturated

19. Capric (10:0)	1.3	1.4	4.0	0.8 - 6.2
20. Lauric (12:0)	4.7	3.3	14.5	2.2 - 27.3
21. Myristic (14:0)	26	20	87	15 - 139
22. Palmitic (16:0)	1,339	792	1,794	667 - 2,526
23. Stearic (18:0)	545	294	511	250 - 629
24. Arachidic (20:0)	3.0	1.5	3.2	1.3 - 4.7
25. Behenic (22:0)	0.9	0.8	2.0	0.6 - 2.9
26. Lignoceric (24:0)	1.31	0.84	1.66	0.63 - 2.45
27. Hexacosanoic (26:0)	0.35		0.36	<= 0.43

Odd Chain

28. Pentadecanoic (15:0)	9.5		14.5	<= 20.6
29. Heptadecanoic (17:0)	18.3		19.3	<= 24.4
30. Nonadecanoic (19:0)	1.83		1.51	<= 1.89
31. Heneicosanoic (21:0)	0.38		0.50	<= 0.74
32. Tricosanoic (23:0)	0.80	H	0.62	<= 0.78

Trans

33. Palmitelaidic (16:1n7t)	1.0		0.4	<= 1.8
34. Total C:18 Trans	21		42	<= 59

Ratios

35. LA/DGLA	33		30	11 - 46
36. EPA/DGLA	0.74		0.24	0.07 - 5.98
37. AA/EPA	10		20	1 - 57
38. Triene/Tetraene	0.008		0.016	<= 0.023

NR = Not Reportable

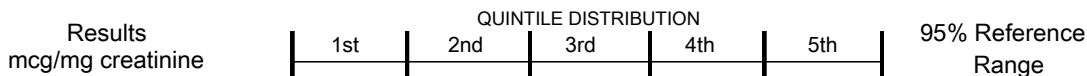


Organix® Comprehensive Profile - Urine

Methodology: LC/Tandem Mass Spectrometry, Colorimetric

This report is not intended for the diagnosis of neonatal inborn errors of metabolism.

Ranges: Ages 13 and over



Nutrient Markers

Fatty Acid Metabolism

(Carnitine & B2)

Item	Results	mcg/mg creatinine	Quintile Distribution	95% Reference Range
1. Adipate	7.8		6.2	<= 11.1
2. Suberate	0.9		2.1	<= 4.6
3. Ethylmalonate	7.9	H	3.6	<= 6.3

Carbohydrate Metabolism

(B1, B3, Cr, Lipoic Acid, CoQ10)

Item	Results	mcg/mg creatinine	Quintile Distribution	95% Reference Range
4. Pyruvate	<DL		3.9	<= 6.4
5. L-Lactate	8.6		8.5	0.6 - 16.4
6. β-Hydroxybutyrate	2.5		2.1	<= 9.9

Energy Production (Citric Acid Cycle)

(B comp., CoQ10, Amino Acids, Mg)

Item	Results	mcg/mg creatinine	Quintile Distribution	95% Reference Range
7. Citrate	570		601	56 - 987
8. Cis-Aconitate	35		51	18 - 78
9. Isocitrate	91		98	39 - 143
10. α-Ketoglutarate	<DL		19.0	<= 35.0
11. Succinate	21.0	H	11.6	<= 20.9
12. Fumarate	<DL		0.59	<= 1.35
13. Malate	1.1		1.4	<= 3.1
14. Hydroxymethylglutarate	3.6		3.6	<= 5.1

B-Complex Vitamin Markers

(B1, B2, B3, B5, B6, Biotin)

Item	Results	mcg/mg creatinine	Quintile Distribution	95% Reference Range
15. α-Ketoisovalerate	<DL		0.25	<= 0.49
16. α-Ketoisocaproate	<DL		0.34	<= 0.52
17. α-Keto-β-Methylvalerate	<DL		0.38	<= 1.10
18. Xanthurenate	<DL		0.34	<= 0.46
19. β-Hydroxyisovalerate	4.5		7.6	<= 11.5

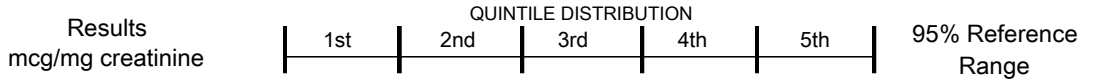


Organix® Comprehensive Profile - Urine

Methodology: LC/Tandem Mass Spectrometry, Colorimetric

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Ranges: Ages 13 and over



Nutrient Markers

Methylation Cofactor Markers

(B12, Folate)

Item	Results	Quintile Distribution	95% Reference Range
20. Methylmalonate	0.6	1.7	<= 2.3
21. Formiminoglutamate	0.5	1.2	<= 2.2

Cell Regulation Markers

Neurotransmitter Metabolism Markers

(Tyrosine, Tryptophan, B6, Antioxidants)

Item	Results	Quintile Distribution	95% Reference Range
22. Vanilmandelate	3.8	1.6 - 3.9	1.2 - 5.3
23. Homovanillate	4.3	1.9 - 5.7	1.4 - 7.6
24. 5-Hydroxyindoleacetate	6.8	2.1 - 5.6	1.6 - 9.8
25. Kynurenate	1.1	1.0	<= 1.5
26. Quinolate	2.6	4.0	<= 5.8
27. Picolinate	5.6	8.0	2.8 - 13.5

Oxidative Damage and Antioxidant Markers

(Vitamin C and Other Antioxidants)

Item	Results	Quintile Distribution	95% Reference Range
28. p-Hydroxyphenyllactate	0.47	0.39	<= 0.66
29. 8-Hydroxy-2-deoxyguanosine	4.9	5.3	<= 7.6

(Units for 8-hydroxy-2-dexoyguanosine are ng/mg creatinine)

Toxicants and Detoxification

Detoxification Indicators

(Arg, NAC, Met, Mg, Antioxidants)

Item	Results	Quintile Distribution	95% Reference Range
30. 2-Methylhippurate	0.111	0.084	<= 0.192
31. Orotate	0.57	0.69	<= 1.01
32. Glucarate	9.9	6.3	<= 10.7
33. α-Hydroxybutyrate	<DL	0.3	<= 0.9
34. Pyroglutamate	67	59	28 - 88
35. Sulfate	1,531	958 - 2,347	690 - 2,988

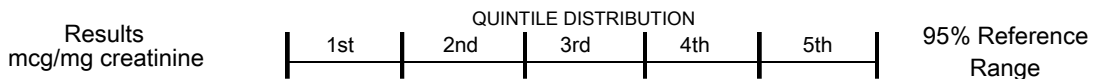


Organix® Comprehensive Profile - Urine

Methodology: LC/Tandem Mass Spectrometry, Colorimetric

This report is not intended for the diagnosis of neonatal inborn errors of metabolism.

Ranges: Ages 13 and over



Compounds of Bacterial or Yeast/Fungal Origin

Bacterial - General

Compound	Results mcg/mg creatinine	Quintile Distribution	95% Reference Range
36. Benzoate	<DL	0.6	<= 9.3
37. Hippurate	709	548	<= 1,070
38. Phenylacetate	0.17	0.11	<= 0.18
39. Phenylpropionate	<DL		<= 0.06
40. p-Hydroxybenzoate	0.5	1.1	<= 1.8
41. p-Hydroxyphenylacetate	10	19	<= 34
42. Indican	93 H	64	<= 90
43. Tricarballoylate	<DL	0.73	<= 1.41

L. acidophilus / General Bacterial

44. D-Lactate	40.0 H	2.0	<= 4.1
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Clostridial Species

45. 3,4-Dihydroxyphenylpropionate	<DL		<= 0.05
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Yeast / Fungal

46. D-Arabinitol	40	36	<= 73
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Creatinine = 48 mg/dL

<DL = less than detection limit
>UL = greater than upper linearity limit
NR = Not reportable



Commentary

The Diasorin Liaison 25-Hydroxyvitamin D Total Assay is certified by the CDC Vitamin D Standardization-Certification Program (CDC VDSCP).

The performance characteristics of all assays have been verified by Genova Diagnostics, Inc. Unless otherwise noted with ♦, the assay has not been cleared by the U.S. Food and Drug Administration.



3100 ION® Profile - Blood / Urine

ION Analyte Pattern Analysis

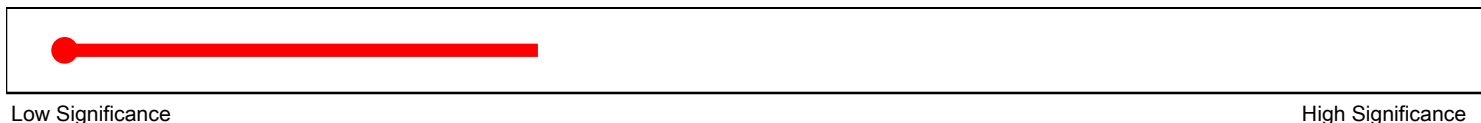
A multi-analyte report can provide greater insight about health risks and special nutrient needs. Patterns of abnormalities can reinforce the degree of significance indicated by a single measurement. Analytes from the various profiles in the ION report are combined below into categories associated with clinical/metabolic conditions.

The categories included cover the most common areas of concern relevant to these profiles. Above each thermometer are listed the analytes used to calculate the degree of significance. An ↑ or ↓ appears when the patient result is outside the fourth quintile of the population.

The thermometer advances to the right as the number and severity of relevant abnormalities increases. The longer the filled bar, the greater the degree of significance or likelihood that a health threat may exist in that category. The preceding laboratory results provide the detail upon which these thermometers are based.

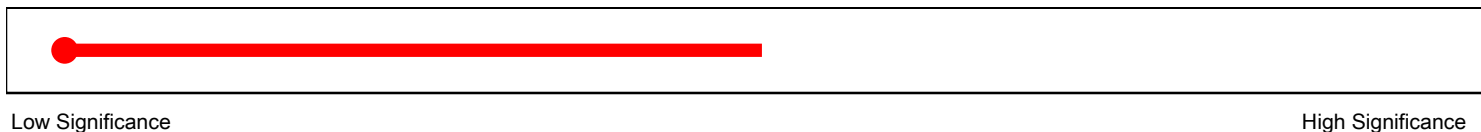
Cardiovascular System

Arginine	Homocysteine	↑	Calcium	Magnesium	↓
Coenzyme Q10	alpha-Tocopherol		gamma-Tocopherol	Lipid Peroxides	
8-OHdG*	AA/EPA				



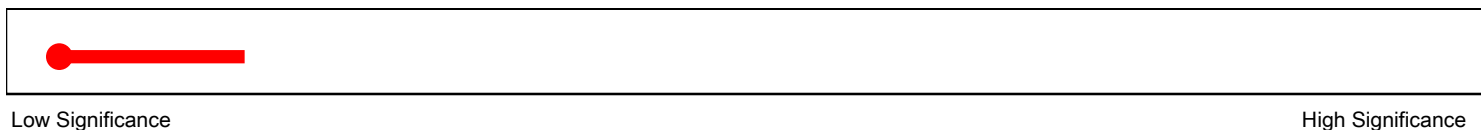
Fatigue

Isoleucine	↓	Leucine	↓	Phenylalanine	↓	Valine
Magnesium	↓	Coenzyme Q10		Adipate	↑	Suberate
α-Ketoglutarate		Succinate	↑	Malate		Xanthurenate
Methylmalonate		Formiminoglutamate				



Metabolic Syndrome (Syndrome X)

Magnesium	↓	Palmitic (16:0)		Stearic (18:0)	↑	α-Hydroxybutyrate
β-Hydroxybutyrate	↑	β-Hydroxyisovalerate				



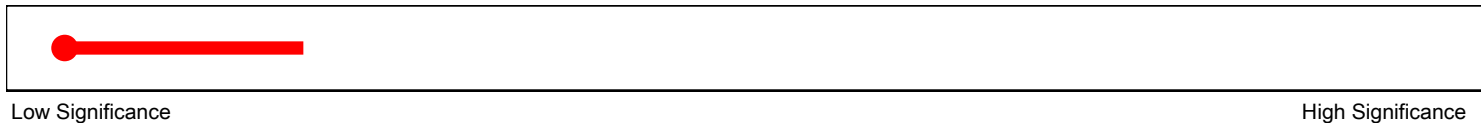
*8-OHdG = 8-Hydroxy-2-deoxyguanosine



3100 ION® Profile - Blood / Urine

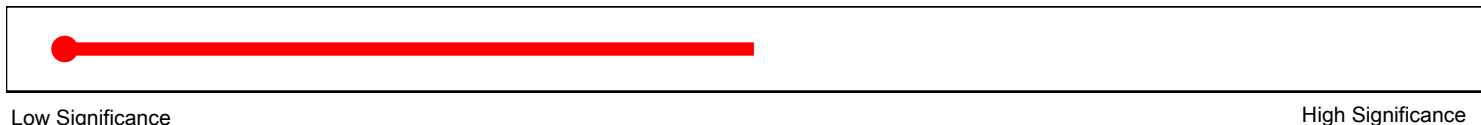
Mental/Emotional

Tryptophan	↓	Tyrosine	↓	Magnesium	↓	Eicosapentanoic
Docosahexaenoic		Xanthurenate		Methylmalonate		Formiminoglutamate
Vanilmandelate		5-Hydroxyindoleacetate	↑			



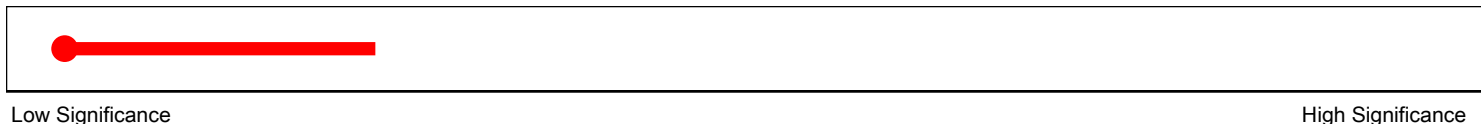
Intestinal/Bacterial Metabolites

Phenylacetate	↑	Phenylpropionate		p-Hydroxybenzoate		p-Hydroxyphenylacetate
Indican	↑	Tricarballoylate		D-Lactate	↑	3,4-DHPP*



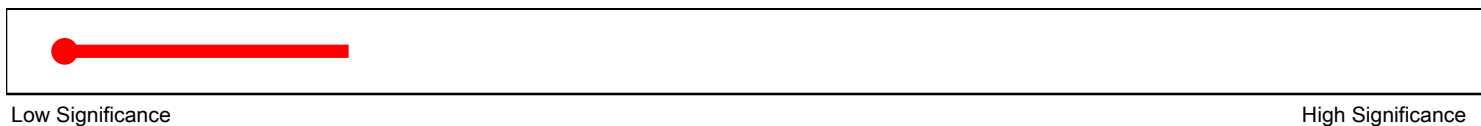
Intestinal Yeasts/Fungal Metabolites

D-Arabinitol	↑
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Digestion/Absorption

Arginine		Histidine		Isoleucine	↓	Leucine	↓
Lysine	↓	Methionine	↓	Phenylalanine	↓	Threonine	
Tryptophan	↓	Valine		Selenium			



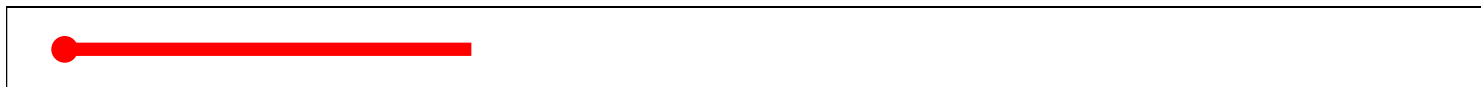
*3,4-DHPP = 3,4-Dihydroxyphenylpropionate



3100 ION® Profile - Blood / Urine

Toxic Exposure

Aluminum	Arsenic	↑	Cadmium	Lead
Mercury	Palmitelaicid (16:1n7t)	↑	Total C:18 Trans	Citrate
Cis-Aconitate	Isocitrate		Quinolate	2-Methylhippurate
Orotate	Glucarate	↑		↑



Low Significance

High Significance

Detoxification Impairment

Methionine	↓	Glycine	Serine	Taurine
Glutamine	↓	Pyroglutamate	↑	Sulfate
				Benzoate



Low Significance

High Significance

Oxidative Stress/Antioxidant Insufficiency

Taurine	Selenium	Lead	Mercury
alpha-Tocopherol	gamma-Tocopherol	Vitamin A (Retinol)	β-Carotene
Lipid Peroxides	8-OHdG*	p-Hydroxyphenyllactate	↑
			Sulfate

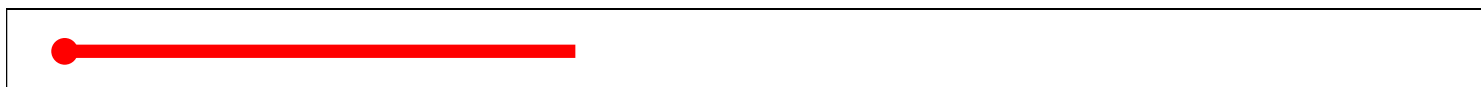


Low Significance

High Significance

Mitochondrial Functional Impairment

Magnesium	↓	Coenzyme Q10	Adipate	↑	Suberate
Ethylmalonate	↑	Pyruvate	L-Lactate	↑	α-Hydroxybutyrate
β-Hydroxybutyrate	↑	Succinate	↑	Fumarate	Malate



Low Significance

High Significance

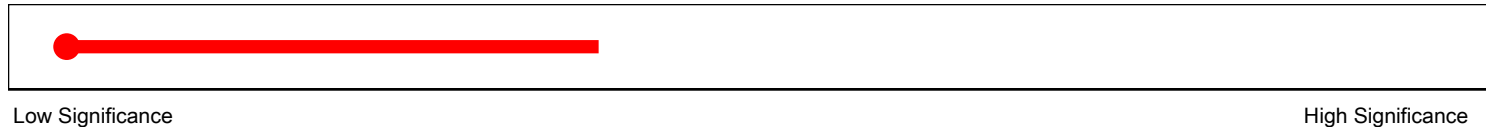
*8-OHdG = 8-Hydroxy-2-deoxyguanosine



3100 ION® Profile - Blood / Urine

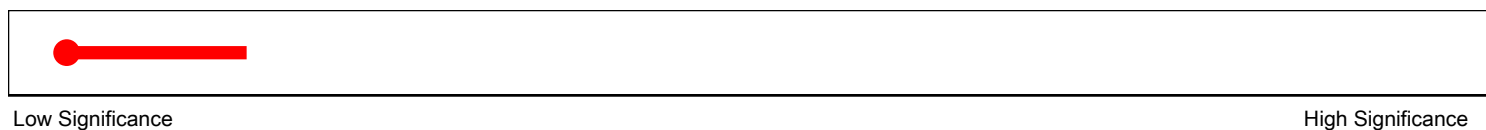
Amino Acid Insufficiency

Arginine		Histidine		Isoleucine	↓	Leucine	↓
Lysine	↓	Methionine	↓	Phenylalanine	↓	Threonine	
Tryptophan	↓	Valine		Sulfate			



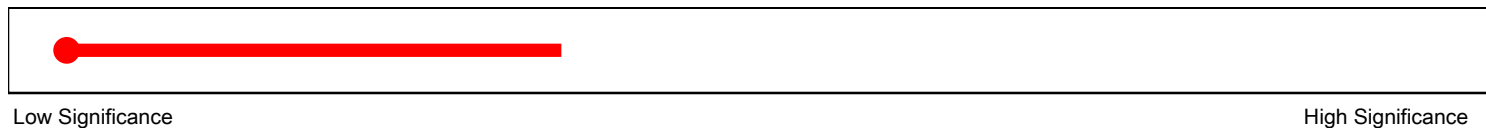
Essential Fatty Acid Insufficiency

Arachidonic	Alpha Linoleic	Eicosapentaenoic	Docosahexaenoic
Linoleic	Gamma Linolenic	↓	Dihomogamma Linolenic
Triene/Tetraene			Palmitoleic



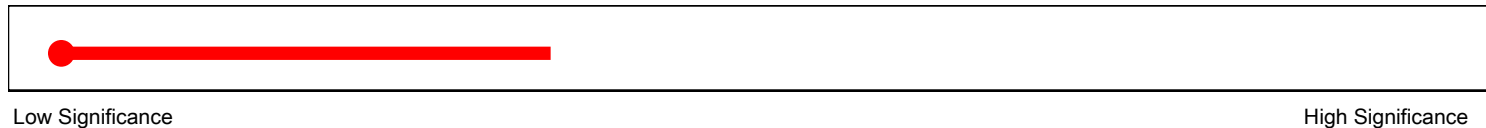
Disordered Methyl Group (Single Carbon) Transfer

Homocysteine	↑	Pentadecanoic	Heptadecanoic	Nonadecanoic	↑
Tricosanoic	↑	Xanthurenate	Methylmalonate	Formiminoglutamate	
Kynurenate	↑				



Disordered Tryptophan Metabolism

Tryptophan	↓	Xanthurenate	5-Hydroxyindoleacetate	↑	Kynurenate	↑
Quinolinate		Indican	↑			





Additional Considerations

Nutrient supplementation is at the *discretion of the treating clinician*. The supplement dose ranges provided below are meant for educational purposes only. These dosage ranges relate to findings commonly found on Genova's nutritional panels and do not apply to specific disease conditions where different dosages may be warranted. Final recommendations should be based on consideration of the patient's medical history and current clinical condition.

Nutrient	Nutrient Need	Clinician Recommendations
Vitamin C	Low: 250-500 mg	
Vitamin B-1 (Thiamin)	Optional: 0-10 mg	
Vitamin B-2 (Riboflavin)	Low: 10-25 mg	
Vitamin B-3 (Niacin)	Optional: 0-10 mg	
Vitamin B-5 (Pantothenic Acid)	Optional: 0-10 mg	
Vitamin B-6 (Pyridoxine)	Moderate: 25-50 mg	
Vitamin B-12 (Cobalamin)	Moderate: 250-500 mcg	
Folic Acid	Low: 250-500 mcg	
Magnesium	Moderate: 200-300 mg	
Zinc	Optional: 0-10 mg	
Black Current Oil/Evening Primrose Oil	Optional	
Carnitine	Low: 100-250 mg	
Coenzyme Q10	Moderate: 60-100 mg	
Lipoic Acid	Optional: 0-100 mg	
N-Acetylcysteine	Optional: 0-200 mg	
Need for other antioxidants	Optional	
L-Glutamine	Low: 500-1000 mg	
L-Isoleucine	Moderate: 500-750 mg	
L-Leucine	Moderate: 1000-2000 mg	
L-Lysine	Low: 500-1000 mg	
L-Methionine	Low: 250-500 mg	
L-Phenylalanine	Low: 250-500 mg	
L-Tryptophan	Moderate: 500-1000 mg	
L-Tyrosine	Low: 250-500 mg	

Various conditionally essential nutrients and other potentially beneficial interventions appear in this section only if relevant abnormalities are present.