Diagnostic Solutions laboratory

5894 Shiloh Rd, Ste 101 | Alpharetta GA 30005
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Patient: Ima Sample
Collected: 11/5/2021
DOB: 11/4/2021
Sex: Male

Accession: OMXTest10
Received: 11/6/2021
Completed: 5/10/2022
Ordered by: Diane Farhi

OAP

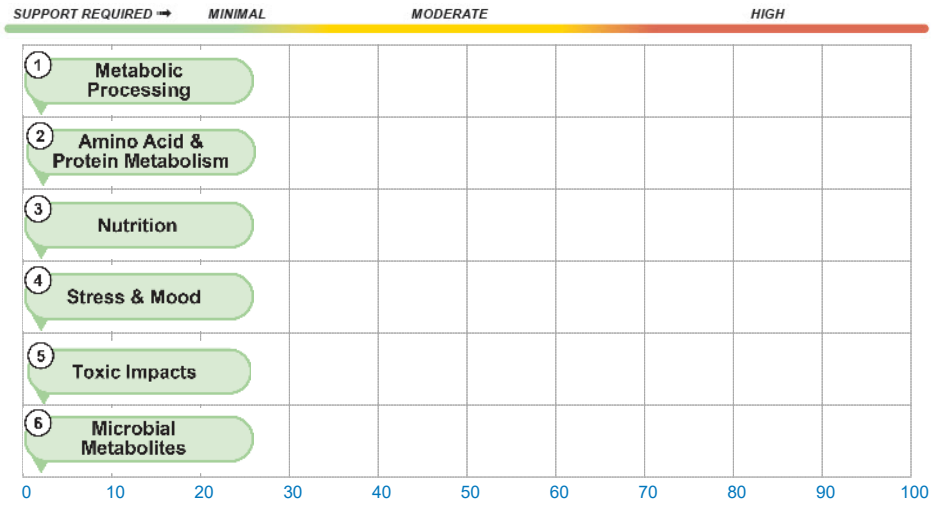
*METHODOLOGY: LC-MS/MS - Organic Acids Urine*

## YOUR PERSONALIZED REPORT

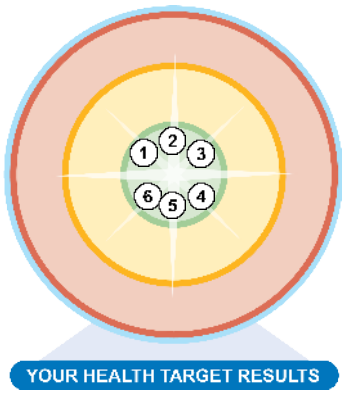
*The charts on this page are designed to give you a bird's-eye-view of your current metabolic signature and help you get a general preview of the detailed report found on the following pages.*

# METABOLOMIC SIGNATURE

## Identifying Impact of Functional Categories




*PERCENT OF MARKERS BEYOND THE REFERENCE RANGE*




*Findings show that 0 of 6 Functional Categories have markers beyond the reference range.*

*Subcategories are identified below.*

## Identifying Impact of Subcategories

*NOTE: Below is a list of the Functional Categories and the included subcategories. It lists the percentage of markers that are beyond the reference range so clinicians can better target areas of concern.*

*PERCENT OF MARKERS BEYOND THE REFERENCE RANGE*

| 0-20% | 21-60% | 61-100% |
|---|---|---|
| *MINIMAL* | *MODERATE* | *HIGH* |

### 1 Metabolic Processing — 0 %

| Subcategory |
|---|
| Glycolysis |
| Krebs Cycle |
| Fatty Acid Oxidation |
| Ketones |

### 2 Amino Acid & Protein Metabolism — 0 %

| Subcategory |
|---|
| Phenylalanine Metabolism |
| Branched-Chain Amino Acids |
| Tryptophan Metabolism |
| Methionine Metabolism |
| Lysine Metabolism |

### 3 Nutrition — 0 %

| Subcategory |
|---|
| B-Complex (B1, B2, B3, B5, LA) |
| Vitamin B-12 |
| Folate |
| Vitamin B6 |
| Biotin |
| Plant Components |
| Sugar Intake |

### 4 Stress & Mood — 0 %

| Subcategory |
|---|
| Catecholamine Turnover |
| Serotonin Turnover |
| Steroid Hormone |

### 5 Toxic Impacts — 0 %

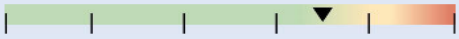
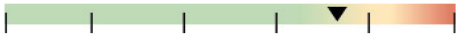
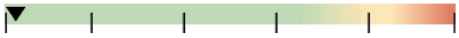
| Subcategory |
|---|
| Oxidative Damage |
| Toxins |
| Kidney Impacts |

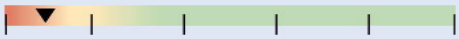
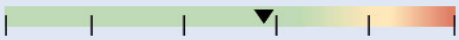
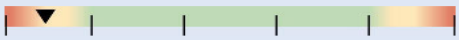
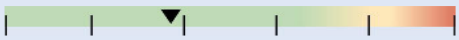
### 6 Microbial Metabolites — 0 %

| Subcategory |
|---|
| Amino Acid Microbial Metabolites |
| Polyphenols Microbial Metabolites |
| Isoflavone Microbial Metabolite |
| Fungal Assessment |

**Patient: Ima Sample** **Accession: OMXTest10**

## 1 - Metabolic Processing

| Glycolysis | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **Glucose**<br>*Glucokinase* | **8.0** |  | < 15.2<br>mg/dL |
| **Pyruvic Acid**<br>*Pyruvate dehydrogenase + B1, B2, B3, B5 LA* | **24.2** |  | < 47.2<br>nmol/mg Creatinine |
| **Lactic Acid**<br>*Lactate dehydrogenase + B3* | **84.3** |  | 23.1 - 722.6<br>nmol/mg Creatinine |
| **D-Lactic Acid**<br>*D-Lactate dehydrogenase* | **0.03** |  | < 20.0<br>nmol/mg Creatinine |

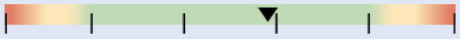
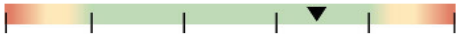
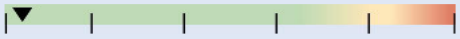
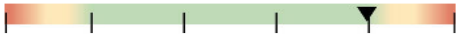
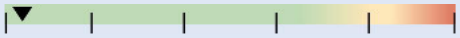
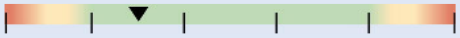
| Krebs Cycle | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **Citric Acid**<br>*Citrate synthase* | **694.1** |  | > 356.2<br>nmol/mg Creatinine |
| ***cis*-Aconitic Acid**<br>*Aconitase* | **192.6** |  | 91.3 - 363.1<br>nmol/mg Creatinine |
| **Isocitric Acid**<br>*Isocitrate dehydrogenase + B3* | **245.2** |  | < 415.6<br>nmol/mg Creatinine |
| **α-Ketoglutaric Acid**<br>*alpha-Ketoglutarate dehydrogenase + B1, B2, B3, B5, LA* | **19.5** |  | < 157.2<br>nmol/mg Creatinine |
| **Succinic Acid**<br>*Succinic dehydrogenase + B2* | **6.4** |  | 4.8 - 224.1<br>nmol/mg Creatinine |
| **Fumaric Acid**<br>*Fumarase* | **840.8** |  | 320.2 - 3375.5<br>nmol/mg Creatinine |
| **Malic Acid**<br>*Malate dehydrogenase + B3* | **4.2** |  | < 21.5<br>nmol/mg Creatinine |

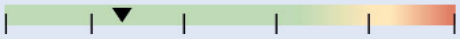
**KEY:** < dl = Results below detection limit.

The assays were developed and/or the performance characteristics determined by Diagnostic Solutions Laboratory. The results are for research and not for diagnostic purposes.

**Patient: Ima Sample** **Accession: OMXTest10**

## 1 - Metabolic Processing

| Fatty Acid Oxidation | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **Adipic Acid**<br>*Saturated dicarboxylic acid* | **4.9** |  | 2.0 - 15.1<br>nmol/mg Creatinine |
| **Suberic Acid**<br>*Fatty acid oxidation + Carnitine* | **11.0** |  | 3.0 - 29.4<br>nmol/mg Creatinine |
| **Sebacic Acid**<br>*Fatty acid oxidation + Carnitine* | **<DL** |  | < 3.7<br>nmol/mg Creatinine |
| **Pimelic Acid**<br>*Saturated dicarboxylic acids* | **17.9** |  | 5.9 - 31.8<br>nmol/mg Creatinine |
| **Hexanoylglycine**<br>*Medium-chain acyl glycines* | **0.5** |  | < 2.6<br>nmol/mg Creatinine |
| **Suberylglycine**<br>*Medium-chain acyl glycines* | **0.7** |  | < 2.3<br>nmol/mg Creatinine |
| **3-Phenylpropionylglycine**<br>*Medium-chain acyl glycines* | **<DL** |  | < 1.3<br>nmol/mg Creatinine |
| **Ethylmalonic Acid**<br>*Dicarboxylic acid* | **14.2** |  | 5.0 - 43.3<br>nmol/mg Creatinine |
| **2-Methylsuccinic Acid**<br>*Dicarboxylic acid* | **5.1** |  | 3.2 - 21.1<br>nmol/mg Creatinine |

| Ketones | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **β-Hydroxybutyric Acid**<br>*beta-Hydroxybutyrate dehydrogenase + B3* | **2.1** |  | < 60.5<br>nmol/mg Creatinine |

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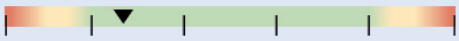
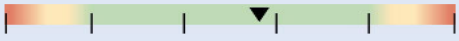
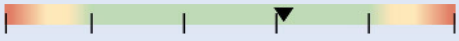
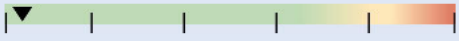
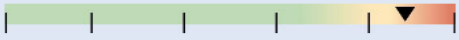
## 2 - Amino Acid & Protein Metabolism

| Phenylalanine Metabolism | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **Phenylacetic Acid**<br>*Aldehyde dehydrogenase* | **0.9** |  | 0.5 - 19.1<br>nmol/mg Creatinine |
| **Homovanillic Acid**<br>*COMT + Magnesium & Monoamine oxidase + B2* | **2.8** |  | < 10.3<br>nmol/mg Creatinine |
| **Vannilylmandelic Acid**<br>*Monoamine oxidase + B2* | **12.3** |  | 4.8 - 21.4<br>nmol/mg Creatinine |
| **4-Hydroxyphenylpyruvic Acid**<br>*Tyrosine aminotransferase + B6* | **183.3** |  | 35.5 - 1116.3<br>nmol/mg Creatinine |
| **Homogentisic Acid**<br>*4-Hydroxyphenylpyruvate dioxygenase + Iron* | **60.8** |  | 7.9 - 336.4<br>nmol/mg Creatinine |

| Branched-Chain Amino Acids | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **α-Ketoisovaleric Acid**<br>*Branched-chain keto acid dehydrogenase + B1, B2, B3, B5, LA* | **<DL** |  | < 11.9<br>nmol/mg Creatinine |
| **α-Keto-β-methylvaleric Acid**<br>*Branched-chain keto acid dehydrogenase + B1, B2, B3, B5, LA* | **0.9** |  | < 11.9<br>nmol/mg Creatinine |
| **α-Ketoisocaproic Acid**<br>*Branched-chain keto acid dehydrogenase + B1, B2, B3, B5, LA* | **12.6** |  | < 17.0<br>nmol/mg Creatinine |

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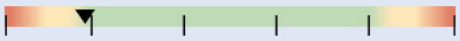
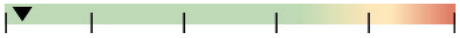
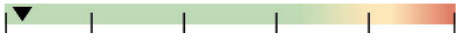
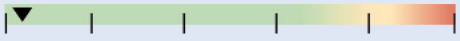
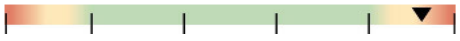
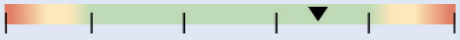
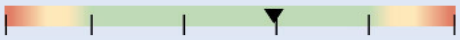
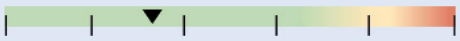
## 2 - Amino Acid & Protein Metabolism

| Tryptophan Metabolism | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **5-Hydroxyindoleacetic Acid**<br>*Aldehyde dehydrogenase + B3* | **9.7** |  | 6.3 - 28.7<br>nmol/mg Creatinine |
| **Hydroxykynurenine**<br>*Kynureninase + B6* | **<DL** |  | < 12.1<br>nmol/mg Creatinine |
| **Xanthurenic Acid**<br>*Kynurenine transaminase + B6* | **2.6** |  | < 9.5<br>nmol/mg Creatinine |
| **Anthranilic Acid**<br>*Kynureninase + B6* | **<DL** |  | < 11.8<br>nmol/mg Creatinine |
| **Picolinic Acid**<br>*Non-enzymatic conversion* | **<DL** |  | < 4.0<br>nmol/mg Creatinine |
| **Kynurenic Acid**<br>*Kynurenine transaminase + B6* | **15.7** |  | 2.1 - 18.5<br>nmol/mg Creatinine |
| **Quinolinic Acid**<br>*Non-enzymatic conversion* | **56.0** |  | 9.0 - 105.7<br>nmol/mg Creatinine |

| Methionine Metabolism | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **α-Hydroxybutyric Acid**<br>*Dehydrogenase + B3* | **30.8** |  | 10.6 - 62.6<br>nmol/mg Creatinine |
| **α-Ketobutyric Acid**<br>*Lactate dehydrogenase + B3* | **<DL** |  | < 7.2<br>nmol/mg Creatinine |
| **Pyroglutamic Acid**<br>*5-Oxoprolinase* | **36.9** |  | < 72.7<br>nmol/mg Creatinine |

| Lysine Metabolism | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **Glutaric Acid**<br>*Glutaryl-CoA dehydrogenase + B2* | **0.8** |  | < 4.5<br>nmol/mg Creatinine |

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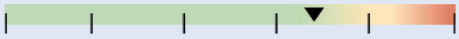
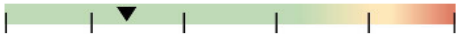
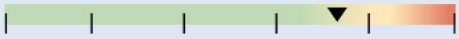
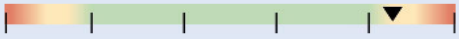
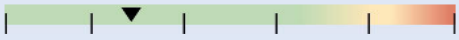
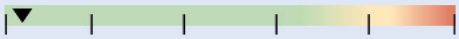
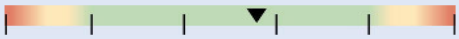
## 3 - Nutrition

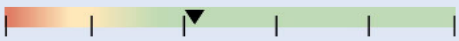
| B-Complex (B1, B2, B3, B5, LA) | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **Branched Chain Alpha-Keto Organic Acids**<br>*Branched-chain keto acid dehydrogenase + B1, B2, B3, B5, LA* | **13.5** |  | < 28.3<br>nmol/mg Creatinine |
| **α-Ketoglutaric Acid**<br>*alpha-Ketoglutarate dehydrogenase + B1, B2, B3, B5, LA* | **19.5** |  | < 157.2<br>nmol/mg Creatinine |
| **Pyruvic Acid**<br>*Pyruvate dehydrogenase + B1, B2, B3, B5, LA* | **24.2** |  | < 47.2<br>nmol/mg Creatinine |

| Vitamin B-12 | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **Methylmalonic Acid**<br>*Methylmalonyl-CoA mutase + B12* | **14.4** |  | 2.7 - 25.9<br>nmol/mg Creatinine |

| Folate | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **Formiminoglutamic Acid**<br>*Glutamate formimino-transferase + Folate* | **0.05** |  | < 0.4<br>nmol/mg Creatinine |

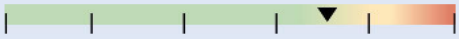
| Vitamin B6 | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **Pyridoxic Acid**<br>*Aldehyde oxidase* | **<DL** |  | < 111.9<br>nmol/mg Creatinine |
| **Xanthurenic Acid**<br>*Kynurenine transaminase + B6* | **2.6** |  | < 9.5<br>nmol/mg Creatinine |

| Biotin | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **β-Hydroxyisovaleric Acid**<br>*Methylcrotonyl-CoA carboxylase + Biotin* | **78.5** |  | 25.1 - 223.4<br>nmol/mg Creatinine |

| Plant Components | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **Quercetin**<br>*Polyphenol: Flavonoid* | **5.3** |  | > 2.7<br>nmol/mg Creatinine |
| **Tartaric Acid**<br>*Plant component* | **5.0** |  | > 1.8<br>nmol/mg Creatinine |

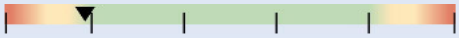
**KEY:** < dl = Results below detection limit.

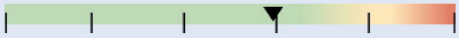
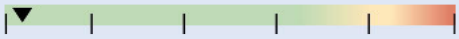
## 3 - Nutrition

| Sugar Intake | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **Fructose**<br>*Fructokinase* | **1.6** |  | < 4.7<br>nmol/mg Creatinine |

## 4 - Stress & Mood

| Catecholamine Turnover | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **Homovanillic Acid**<br>*COMT + magnesium & monoamine oxidase + B2* | **2.8** |  | < 10.3<br>nmol/mg Creatinine |
| **Vannilylmandelic Acid**<br>*Monoamine oxidase + B2* | **12.3** |  | 4.8 - 21.4<br>nmol/mg Creatinine |

| Serotonin Turnover | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **5-Hydroxyindoleacetic Acid**<br>*Aldehyde dehydrogenase + B3* | **9.7** |  | 6.3 - 28.7<br>nmol/mg Creatinine |

| Steroid Hormone | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **Cortisol**<br>*11-beta-Hydroxysteroid dehydrogenase + B3* | **20.5** |  | < 82.0<br>mcg/g Creatinine |
| **Cortisone**<br>*11-beta-Hydroxysteroid dehydrogenase + B3* | **92.9** |  | < 695.1<br>mcg/g Creatinine |
| **Aldosterone**<br>*Steroid 5-beta reductase* | **<DL** |  | < 0.5<br>mcg/g Creatinine |

**KEY:** < dl = Results below detection limit.

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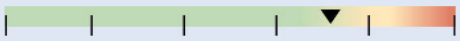
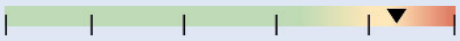
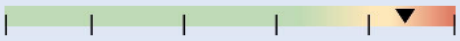
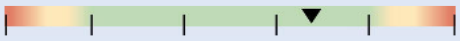
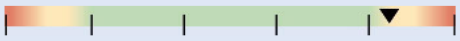
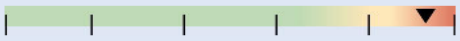
## 5 - Toxic Impacts

| Oxidative Damage | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **8-Hydroxy-2'-deoxyguanosine**<br>*DNA oxidation* | **2.7** |  | < 8.4<br>nmol/mg Creatinine |

| Toxins | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **2-Methylhippuric Acid**<br>*Xylene exposure* | **1.2** |  | < 2.1<br>nmol/mg Creatinine |
| **Mandelic Acid**<br>*Styrene exposure* | **1.3** |  | < 4.6<br>nmol/mg Creatinine |
| **Benzoylform**<br>*Styrene exposure* | **2.9** |  | < 4.3<br>nmol/mg Creatinine |
| **Glucaric Acid**<br>*Glucuronic Acid Pathway* | **7.7** |  | 3.6 - 25.8<br>nmol/mg Creatinine |

| Kidney Impacts | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **Orotic Acid**<br>*Uridine monophosphate synthase* | **2.7** |  | 0.7 - 6.0<br>nmol/mg Creatinine |
| **Microalbumin**<br>*Blood protein* | **<DL** |  | < 130.4<br>mcg/g Creatinine |
| **Phosphate**<br>*Charged particle (ion)* | **145.0** |  | 11.2 - 192.4<br>mg/dL |
| **Creatinine**<br>*Creatine breakdown* | **150.0** |  | 29.3 - 296.8<br>mg/dL |
| **Oxalic Acid**<br>*Divalent metallic cations* | **533.3** |  | < 1532.5<br>nmol/mg Creatinine |

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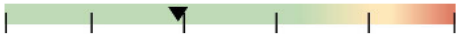
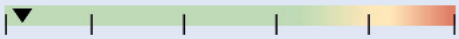
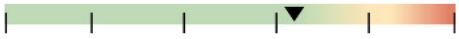
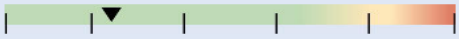
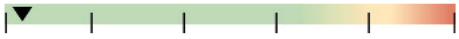
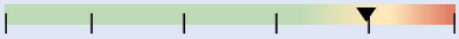
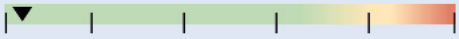
## 6 - Microbial Metabolites

| Amino Acid Microbial Metabolites | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **4-Hydroxyphenylacetic Acid**<br>*Disordered tyrosine metabolism* | 175.5 |  | 85.8 - 902.3<br>nmol/mg Creatinine |
| **Indoleacetic Acid**<br>*Disordered tryptophan metabolism* | 1.3 |  | < 13.7<br>nmol/mg Creatinine |

| Polyphenols Microbial Metabolites | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **3,4-Dihydroxyhydrocinnamic Acid**<br>*Polyphenol metabolite* | <DL |  | < 1490.3<br>nmol/mg Creatinine |
| **3,5-Dihydroxybenzoic Acid**<br>*Microbial metabolite* | 70.9 |  | < 277.1<br>nmol/mg Creatinine |
| **4-Hydroxybenzoic Acid**<br>*Hydroxybenzoic acid derivative* | 2.6 |  | < 14.9<br>nmol/mg Creatinine |
| **Benzoic Acid**<br>*Glycine N-benzoyltransferase* | <DL |  | < 488.0<br>nmol/mg Creatinine |
| **Hippuric Acid**<br>*Glycine conjugate of benzoate* | 184.9 |  | < 291.9<br>nmol/mg Creatinine |

| Isoflavone Microbial Metabolite | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **Equol**<br>*Isoflavone metabolite* | <DL |  | < 12.8<br>nmol/mg Creatinine |

| Fungal Assessment | Result | 20% 40% 60% 80% | Reference |
|---|---|---|---|
| **Arabinitol**<br>*Dehydrogenase* | 2.8 |  | < 9.0<br>nmol/mg Creatinine |

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## PERSONALIZED METABOLOMIC RECOMMENDATIONS

*Note: Nutrient supplementation is up to the treating clinician's discretion with full understanding of the patient's medical history and current clinical condition.*

| MICRONUTRIENTS | *Support Required* | Recommendations | Food Sources |
|---|---|---|---|
| **B-Complex** | None | No Additional Support | Mixed diet |
| **Thiamin (B1)** | None | 1.2 mg* | Rice, wheat germ, lentils, peas, pork, whole wheat bread, spinach |
| **Riboflavin (B2)** | None | 1.3 mg* | Milk, almonds, eggs, salmon, chicken, broccoli, spinach |
| **Niacin (B3)** | None | 16 mg* | Chicken, tuna, turkey, cereal, peanuts, lentils, coffee |
| **Cobalamine (B12)** | None | 2.4 mcg* | Clams, mussels, mackerel, crab, beef, salmon, milk, eggs |
| **Folate (B9)** | None | 400 mcg DFE* | Lentils, garbanzo beans, spinach, asparagus, lima beans, orange juice |
| **Biotin (B7)** | None | 30 mcg* | Eggs, liver, salmon, avocado, raspberries, cauliflower, bread |
| **CoQ10** | None | 6 mg | Beef, herring, chicken, canola oil, Rainbow trout, peanuts, pistachio nuts, brocolli |
| **Magnesium** | None | 420 mg* | Beef, pork, milk, cod, chicken, avocado |
| **Carnitine** | None | 10+ mg | Beef, pork, milk, cod, chicken, avocado |
| **Copper** | None | 0.9 mcg | Eastern oysters, crab meat, clams, cashews, sunflowers, hazelnuts, almonds |

** DV or Daily Values, are the recommended amounts of nutrients per day for a healthy, non-deficient adult.*

| ADDITIONAL SUPPORT | *Support Required* | Suggested Recommendation |
|---|---|---|
| **Glutathione Need** | None | No Additional Support |
| **Inflammation** | None | No Additional Support |
| **Kidney Parameters** | None | No Additional Support |