GENOVA DIAGNOSTICS EUROPE

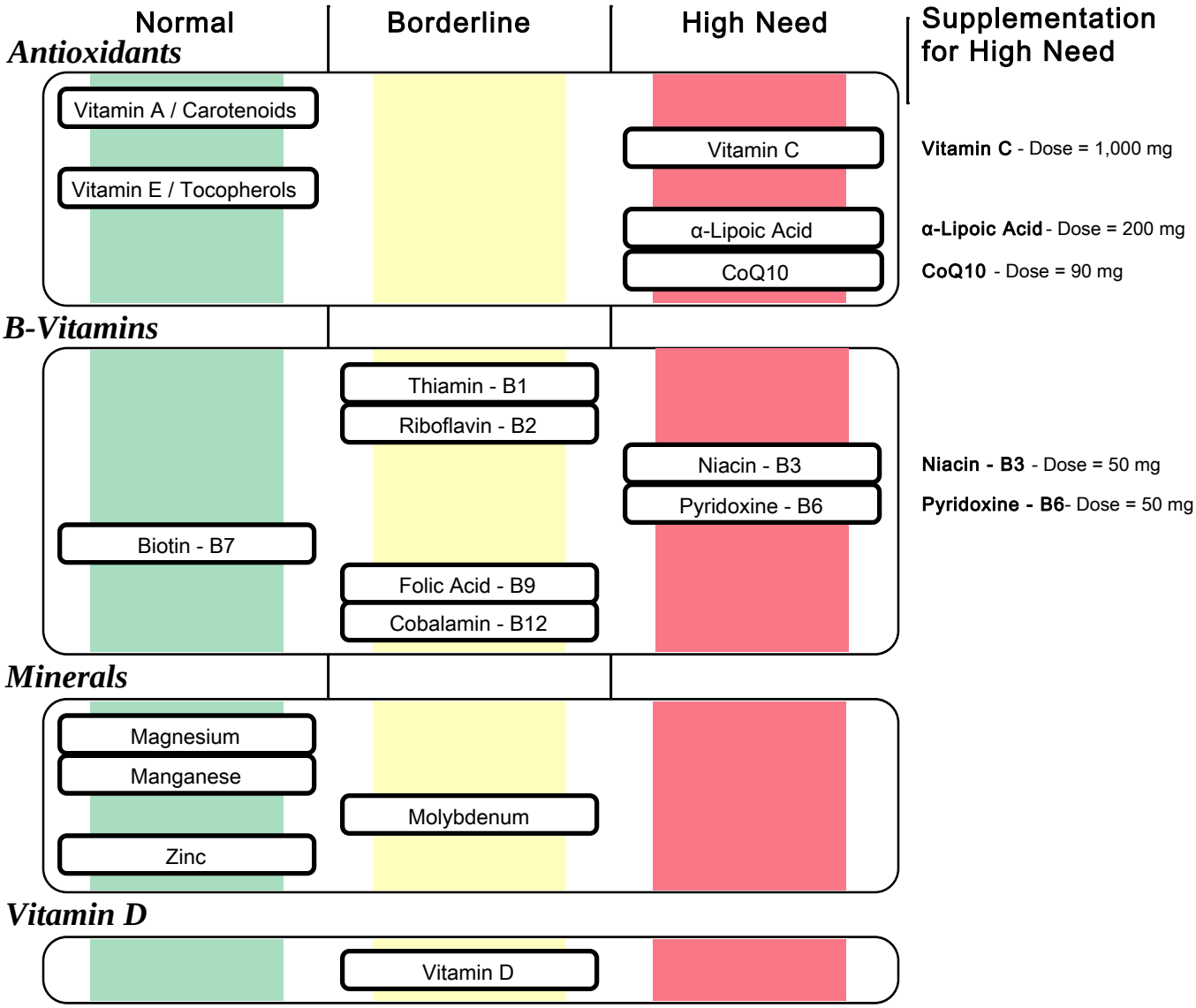
Parkgate House
356 West Barnes Lane
New Malden, Surrey KT3 6NB

63 Zillicoa Street
Asheville, NC 28801 USA

Patient: **JANE DOE**
DOBase:
March 29, 1978 Sex: F

Order Number: K000000
Completed: August 16, 2016 15:52
Received: August 03, 2016 08:39
Collected: August 03, 2016 03:05

NutrEval Results Overview



SUGGESTED SUPPLEMENT SCHEDULE

Supplements	Daily Recommended Intake (DRI)	Patient's Daily Recommendations	Provider Daily Recommendations
Antioxidants			
Vitamin A / Carotenoids	2,333 IU	3,000 IU	
Vitamin C	75 mg	1,000 mg	
Vitamin E / Tocopherols	22 IU	100 IU	
α-Lipoic Acid		200 mg	
CoQ10		90 mg	
B-Vitamins			
Thiamin - B1	1.1 mg	25 mg	
Riboflavin - B2	1.1 mg	25 mg	
Niacin - B3	14 mg	50 mg	
Pyridoxine - B6	1.3 mg	50 mg	
Biotin - B7	30 mcg	100 mcg	
Folic Acid - B9	400 mcg	800 mcg	
Cobalamin - B12	2.4 mcg	500 mcg	
Minerals			
Magnesium	320 mg	400 mg	
Manganese	1.8 mg	3.0 mg	
Molybdenum	45 mcg	150 mcg	
Zinc	8 mg	10 mg	
Essential Fatty Acids			
Omega-3 Oils	500 mg	500 mg	
Digestive Support			
Probiotics		25 billion CFU	
Pancreatic Enzymes		5,000 IU	
Other Vitamins			
Vitamin D	600 IU	2,500 IU	

Amino Acid	mg/day	Amino Acid	mg/day
Arginine	468	Methionine	0
Asparagine	88	Phenylalanine	0
Cysteine	0	Serine	0
Glutamine	571	Taurine	0
Glycine	1,024	Threonine	136
Histidine	0	Tryptophan	0
Isoleucine	0	Tyrosine	208
Leucine	0	Valine	93
Lysine	843		

Recommendations for age and gender-specific supplementation are set by comparing levels of nutrient functional need to optimal levels as described in the peer-reviewed literature. They are provided as guidance for short-term support of nutritional deficiencies only.

The Suggested Supplemental Schedule is provided at the request of the ordering practitioner. Any application of it as a therapeutic intervention is to be determined by the ordering practitioner.

Key Normal Borderline High Need

NutrEval FMV amino acids — Interpretation At-A-Glance

Nutritional Needs

Antioxidants

Vitamin A / Carotenoids

- Beta-carotene & other carotenoids are converted to vitamin A (retinol), involved in vision, antioxidant & immune function, gene expression & cell growth.
- Vitamin A deficiency may occur with chronic alcoholism, zinc deficiency, hypothyroidism, or oral contraceptives containing estrogen & progestin.
- Deficiency may result in night blindness, impaired immunity, healing & tissue regeneration, increased risk of infection, leukoplakia or keratosis.
- Food sources include cod liver oil, fortified cereals & milk, eggs, sweet potato, pumpkin, carrot, cantaloupe, mango, spinach, broccoli, kale & butternut squash.

Vitamin C

- Vitamin C is an antioxidant (also used in the regeneration of other antioxidants). It is involved in cholesterol metabolism, the production & function of WBCs and antibodies, and the synthesis of collagen, norepinephrine and carnitine.
- Deficiency may occur with oral contraceptives, aspirin, diuretics or NSAIDs.
- Deficiency can result in scurvy, swollen gingiva, periodontal destruction, loose teeth, sore mouth, soft tissue ulcerations, or increased risk of infection.
- Food sources include oranges, grapefruit, strawberries, tomato, sweet red pepper, broccoli and potato.

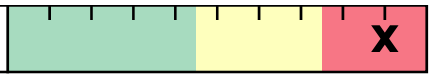
Vitamin E / Tocopherols

- Alpha-tocopherol (body's main form of vitamin E) functions as an antioxidant, regulates cell signaling, influences immune function and inhibits coagulation.
- Deficiency may occur with malabsorption, cholestyramine, colestipol, isoniazid, orlistat, olestra and certain anti-convulsants (e.g., phenobarbital, phenytoin).
- Deficiency may result in peripheral neuropathy, ataxia, muscle weakness, retinopathy, and increased risk of CVD, prostate cancer and cataracts.
- Food sources include oils (olive, soy, corn, canola, safflower, sunflower), eggs, nuts, seeds, spinach, carrots, avocado, dark leafy greens and wheat germ.

α-Lipoic Acid

- α-Lipoic acid plays an important role in energy production, antioxidant activity (including the regeneration of vitamin C and glutathione), insulin signaling, cell signaling and the catabolism of α-keto acids and amino acids.
- High biotin intake can compete with lipoic acid for cell membrane entry.
- Optimal levels of α-lipoic acid may improve glucose utilization and protect against diabetic neuropathy, vascular disease and age-related cognitive decline.
- Main food sources include organ meats, spinach and broccoli. Lesser sources include tomato, peas, Brussels sprouts and brewer's yeast.

CoQ10

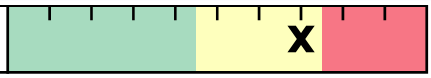


- CoQ10 is a powerful antioxidant that is synthesized in the body and contained in cell membranes. CoQ10 is also essential for energy production & pH regulation.
- CoQ10 deficiency may occur with HMG-CoA reductase inhibitors (statins), several anti-diabetic medication classes (biguanides, sulfonylureas) or beta-blockers.
- Low levels may aggravate oxidative stress, diabetes, cancer, congestive heart failure, cardiac arrhythmias, gingivitis and neurologic diseases.
- Main food sources include meat, poultry, fish, soybean, canola oil, nuts and whole grains. Moderate sources include fruits, vegetables, eggs and dairy.

Glutathione

- Glutathione (GSH) is composed of cysteine, glutamine & glycine. GSH is a source of sulfate and plays a key role in antioxidant activity and detoxification of toxins.
- GSH requirement is increased with high-fat diets, cigarette smoke, cystinuria, chronic alcoholism, chronic acetaminophen use, infection, inflammation and toxic exposure.
- Deficiency may result in oxidative stress & damage, impaired detoxification, altered immunity, macular degeneration and increased risk of chronic illness.
- Food sources of GSH precursors include meats, poultry, fish, soy, corn, nuts, seeds, wheat germ, milk and cheese.

Plant-based Antioxidants



- Oxidative stress is the imbalance between the production of free radicals and the body's ability to readily detoxify these reactive species and/or repair the resulting damage with anti-oxidants.
- Oxidative stress can be endogenous (energy production and inflammation) or exogenous (exercise, exposure to environmental toxins).
- Oxidative stress has been implicated clinically in the development of neurodegenerative diseases, cardiovascular diseases and chronic fatigue syndrome.
- Antioxidants may be found in whole food sources (e.g., brightly colored fruits & vegetables, green tea, turmeric) as well as nutraceuticals (e.g., resveratrol, EGCG, lutein, lycopene, ginkgo, milk thistle, etc.).

Key

- Function
- Causes of Deficiency
- Complications of Deficiency
- Food Sources

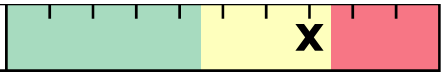
NutrEval FMV amino acids

Interpretation At-A-Glance

Nutritional Needs

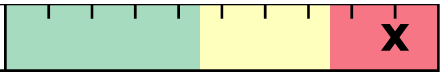
B-Vitamins

Thiamin - B1



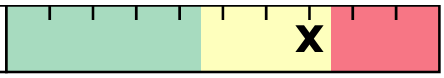
- B1 is a required cofactor for enzymes involved in energy production from food, and for the synthesis of ATP, GTP, DNA, RNA and NADPH.
- Low B1 can result from chronic alcoholism, diuretics, digoxin, oral contraceptives and HRT, or large amounts of tea & coffee (contain anti-B1 factors).
- B1 deficiency may lead to dry beriberi (e.g., neuropathy, muscle weakness), wet beriberi (e.g., cardiac problems, edema), encephalopathy or dementia.
- Food sources include lentils, whole grains, wheat germ, Brazil nuts, peas, organ meats, brewer's yeast, blackstrap molasses, spinach, milk & eggs.

Pyridoxine - B6



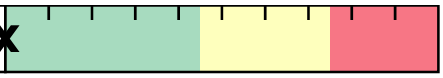
- B6 (as P5P) is a cofactor for enzymes involved in glycogenolysis & gluconeogenesis, and synthesis of neurotransmitters, heme, B3, RBCs and nucleic acids.
- Low B6 may result from chronic alcoholism, long-term diuretics, estrogens (oral contraceptives and HRT), anti-TB meds, penicillamine, L-DOPA or digoxin.
- B6 deficiency may result in neurologic symptoms (e.g., irritability, depression, seizures), oral inflammation, impaired immunity or increased homocysteine.
- Food sources include poultry, beef, beef liver, fish, whole grains, wheat germ, soybean, lentils, nuts & seeds, potato, spinach and carrots.

Riboflavin - B2



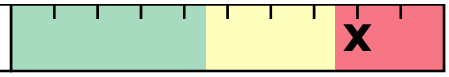
- B2 is a key component of enzymes involved in antioxidant function, energy production, detoxification, methionine metabolism and vitamin activation.
- Low B2 may result from chronic alcoholism, some anti-psychotic medications, oral contraceptives, tricyclic antidepressants, quinacrine or adriamycin.
- B2 deficiency may result in oxidative stress, mitochondrial dysfunction, low uric acid, low B3 or B6, high homocysteine, anemia or oral & throat inflammation.
- Food sources include milk, cheese, eggs, whole grains, beef, chicken, wheat germ, fish, broccoli, asparagus, spinach, mushrooms and almonds.

Biotin - B7



- Biotin is a cofactor for enzymes involved in functions such as fatty acid synthesis, mitochondrial FA oxidation, gluconeogenesis and DNA replication & transcription.
- Deficiency may result from certain inborn errors, chronic intake of raw egg whites, long-term TPN, anticonvulsants, high-dose B5, sulfa drugs & other antibiotics.
- Low levels may result in neurologic symptoms (e.g., paresthesias, depression), hair loss, scaly rash on face or genitals or impaired immunity.
- Food sources include yeast, whole grains, wheat germ, eggs, cheese, liver, meats, fish, wheat, nuts & seeds, avocado, raspberries, sweet potato and cauliflower.

Niacin - B3

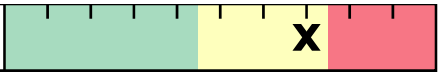


- B3 is used to form NAD and NADP, involved in energy production from food, fatty acid & cholesterol synthesis, cell signaling, DNA repair & cell differentiation.
- Low B3 may result from deficiencies of tryptophan (B3 precursor), B6, B2 or Fe (cofactors in B3 production), or from long-term isoniazid or oral contraceptive use.
- B3 deficiency may result in pellagra (dermatitis, diarrhea, dementia), neurologic symptoms (e.g., depression, memory loss), bright red tongue or fatigue.
- Food sources include poultry, beef, organ meats, fish, whole grains, peanuts, seeds, lentils, brewer's yeast and lima beans.

Folic Acid - B9

- Folic acid plays a key role in coenzymes involved in DNA and SAMe synthesis, methylation, nucleic acids & amino acid metabolism and RBC production.
- Low folate may result from alcoholism, high-dose NSAIDs, diabetic meds, H2 blockers, some diuretics and anti-convulsants, SSRIs, methotrexate, trimethoprim, pyrimethamine, triamterene, sulfasalazine or cholestyramine.
- Folate deficiency can result in anemia, fatigue, low methionine, increased homocysteine, impaired immunity, heart disease, birth defects and CA risk.
- Food sources include fortified grains, green vegetables, beans & legumes.

Cobalamin - B12



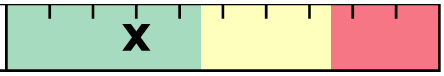
- B12 plays important roles in energy production from fats & proteins, methylation, synthesis of hemoglobin & RBCs, and maintenance of nerve cells, DNA & RNA.
- Low B12 may result from alcoholism, malabsorption, hypochlorhydria (e.g., from atrophic gastritis, H. pylori infection, pernicious anemia, H2 blockers, PPIs), vegan diets, diabetic meds, cholestyramine, chloramphenicol, neomycin or colchicine.
- B12 deficiency can lead to anemia, fatigue, neurologic symptoms (e.g., paresthesias, memory loss, depression, dementia), methylation defects or chromosome breaks.
- Food sources include shellfish, red meat poultry, fish, eggs, milk and cheese.

NutrEval FMV amino acids — Interpretation At-A-Glance

Nutritional Needs

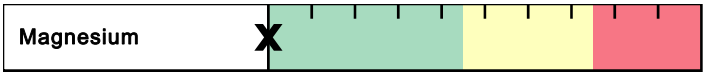
Minerals

Manganese



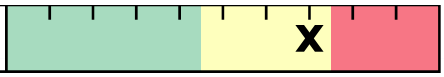
- Manganese plays an important role in antioxidant function, gluconeogenesis, the urea cycle, cartilage & bone formation, energy production and digestion.
- Impaired absorption of Mn may occur with excess intake of Fe, Ca, Cu, folic acid, or phosphorous compounds, or use of long-term TPN, Mg-containing antacids or laxatives.
- Deficiency may result in impaired bone/connective tissue growth, glucose & lipid dysregulation, infertility, oxidative stress, inflammation or hyperammonemia.
- Food sources include whole grains, legumes, dried fruits, nuts, dark green leafy vegetables, liver, kidney and tea.

Magnesium



- Magnesium is involved in >300 metabolic reactions. Key areas include energy production, bone & ATP formation, muscle & nerve conduction and cell signaling.
- Deficiency may occur with malabsorption, alcoholism, hyperparathyroidism, renal disorders (wasting), diabetes, diuretics, digoxin or high doses of zinc.
- Low Mg may result in muscle weakness/spasm, constipation, depression, hypertension, arrhythmias, hypocalcemia, hypokalemia or personality changes.
- Food sources include dark leafy greens, oatmeal, buckwheat, unpolished grains, chocolate, milk, nuts & seeds, lima beans and molasses.

Molybdenum



- Molybdenum is a cofactor for enzymes that convert sulfites to sulfate, and nucleotides to uric acid, and that help metabolize aldehydes & other toxins.
- Low Mo levels may result from long-term TPN that does not include Mo.
- Mo deficiency may result in increased sulfite, decreased plasma uric acid (and antioxidant function), deficient sulfate, impaired sulfation (detoxification), neurologic disorders or brain damage (if severe deficiency).
- Food sources include buckwheat, beans, grains, nuts, beans, lentils, meats and vegetables (although Mo content of plants depends on soil content).

Zinc

- Zinc plays a vital role in immunity, protein metabolism, heme synthesis, growth & development, reproduction, digestion and antioxidant function.
- Low levels may occur with malabsorption, alcoholism, chronic diarrhea, diabetes, excess Cu or Fe, diuretics, ACE inhibitors, H2 blockers or digoxin.
- Deficiency can result in hair loss and skin rashes, also impairments in growth & healing, immunity, sexual function, taste & smell and digestion.
- Food sources include oysters, organ meats, soybean, wheat germ, seeds, nuts, red meat, chicken, herring, milk, yeast, leafy and root vegetables.

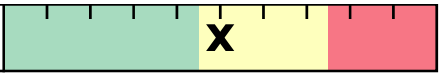
Essential Fatty Acids

Need for Essential Fatty Acids

- Omega-3 (O3) and Omega-6 (O6) fatty acids are polyunsaturated fatty acids that cannot be synthesized by the human body. They are classified as essential nutrients and must be obtained from dietary sources.
- The standard American diet is much higher in O6 than O3 fatty acids. Deficiency of EFAs may result from poor dietary intake and/or poor conversion from food sources.
- EFA deficiency is associated with decreased growth & development of infants and children, dry skin/rash, poor wound healing, and increased risk of infection, cardiovascular and inflammatory diseases.
- Dietary sources of the O6 Linoleic Acid (LA) include vegetable oils, nuts, seeds and some vegetables. Dietary sources of the O3 a-Linolenic Acid (ALA) include flaxseeds, walnuts, and their oils. Fish (mackerel, salmon, sardines) are the major dietary sources of the O3 fatty acids EPA and DHA.

Digestive Support

Need for Probiotics

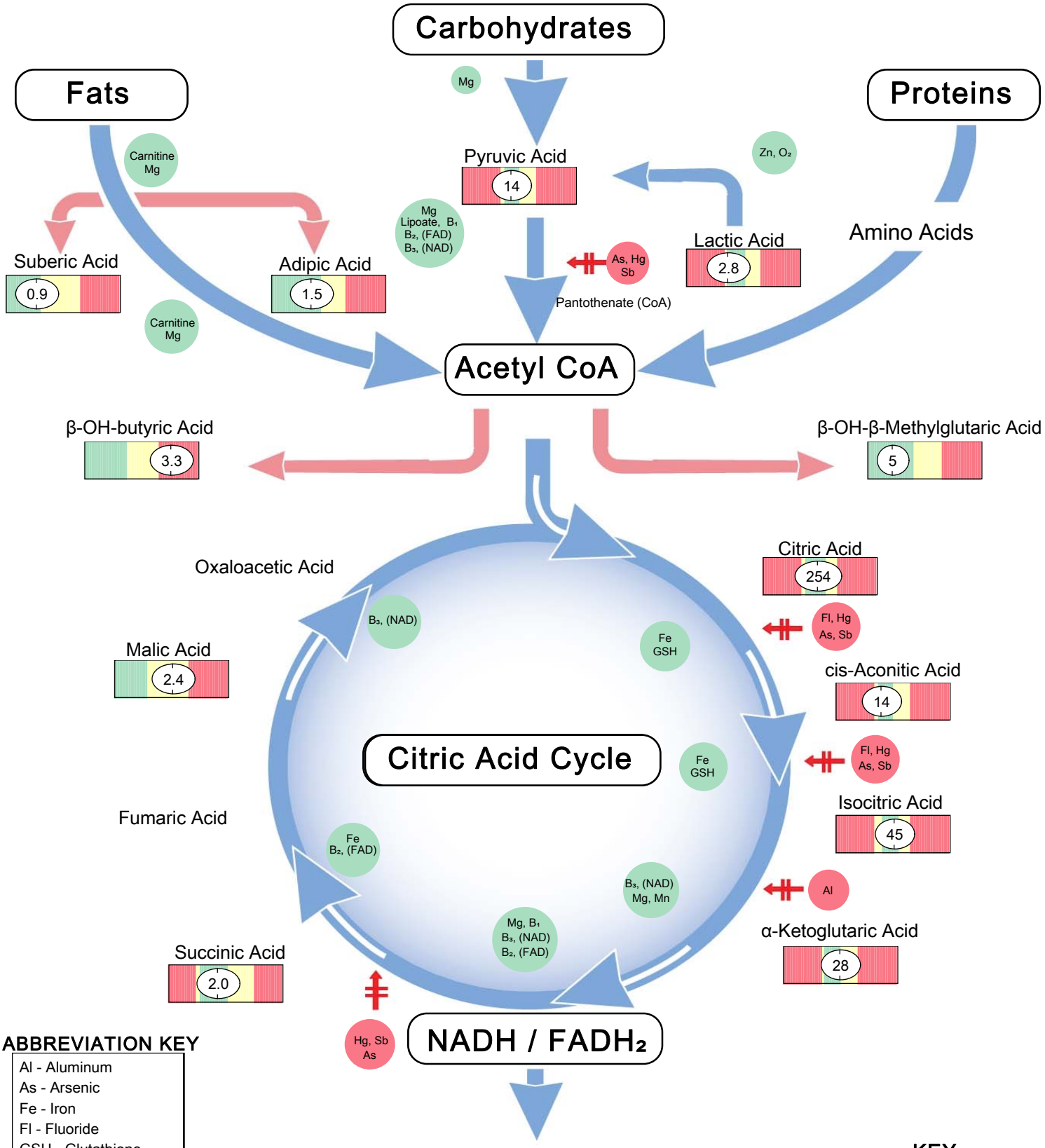


- Probiotics have many functions. These include: production of some B vitamins and vitamin K; enhance digestion & absorption; decrease severity of diarrheal illness; modulate of immune function & intestinal permeability.
- Alterations of gastrointestinal microflora may result from C-section delivery, antibiotic use, improved sanitation, decreased consumption of fermented foods and use of certain drugs.
- Some of the diseases associated with microflora imbalances include: IBS, IBD, fibromyalgia, chronic fatigue syndrome, obesity, atopic illness, colic and cancer.
- Food sources rich in probiotics are yogurt, kefir and fermented foods.

Need for Pancreatic Enzymes

- Pancreatic enzymes are secreted by the exocrine glands of the pancreas and include protease/peptidase, lipase and amylase.
- Pancreatic exocrine insufficiency may be primary or secondary in nature. Any indication of insufficiency warrants further evaluation for underlying cause (i.e., celiac disease, small intestine villous atrophy, small bowel bacterial overgrowth).
- A high functional need for digestive enzymes suggests that there is an impairment related to digestive capacity.
- Determining the strength of the pancreatic enzyme support depends on the degree of functional impairment. Supplement potency is based on the lipase units present in both prescriptive and non-prescriptive agents.

Krebs Cycle At-A-Glance



ABBREVIATION KEY

- Al - Aluminum
- As - Arsenic
- Fe - Iron
- Fl - Fluoride
- GSH - Glutathione
- Hg - Mercury
- Mg - Magnesium
- Mn - Manganese
- Sb - Antimony
- Zn - Zinc

KEY

Green = cofactor

Red = inhibitor

Metabolic Analysis Markers (Urine)

All biomarkers reported in mmol/mol creatinine unless otherwise noted.

Malabsorption and Dysbiosis Markers

Malabsorption Markers

		Reference Range
Indoleacetic Acid (IAA)	0.7	<= 4.2
Phenylacetic Acid (PAA)	0.10	<= 0.12

Bacterial Dysbiosis Markers

		Reference Range
Dihydroxyphenylpropionic Acid (DHPPA)	2.9	<= 5.3
3-Hydroxyphenylacetic Acid	14.1	<= 8.1
4-Hydroxyphenylacetic Acid	16	<= 29
Benzoic Acid	0.06	<= 0.05
Hippuric Acid	170	<= 603

Yeast / Fungal Dysbiosis Markers

		Reference Range
Arabinose	36	<= 96
Citramalic Acid	3.0	<= 5.8
Tartaric Acid	<dl	<= 15

Cellular Energy & Mitochondrial Metabolites

Carbohydrate Metabolism

		Reference Range
Lactic Acid	2.8	1.9-19.8
Pyruvic Acid	14	7-32
β-OH-Butyric Acid (BHBA)	3.3	<= 2.8

Energy Metabolism

		Reference Range
Citric Acid	254	40-520
Cis-Aconitic Acid	14	10-36
Isocitric Acid	45	22-65
α-Ketoglutaric Acid (AKG)	28	4-52
Succinic Acid	2.0	0.4-4.6
Malic Acid	2.4	<= 3.0
β-OH-β-Methylglutaric Acid (HMG)	5	<= 15

Fatty Acid Metabolism

		Reference Range
Adipic Acid	1.5	<= 2.8
Suberic Acid	0.9	<= 2.1

Creatinine Concentration

		Reference Range
Creatinine ◆	13.1	3.1-19.5 mmol/L

Neurotransmitter Metabolites

		Reference Range
Vanilmandelic Acid	1.5	0.4-3.6
Homovanillic Acid	2.9	1.2-5.3
5-OH-indoleacetic Acid	10.3	3.8-12.1
3-Methyl-4-OH-phenylglycol	0.08	0.02-0.22
Kynurenic Acid	11.1	<= 7.1
Quinolinic Acid	3.5	<= 9.1
Kynurenic / Quinolinic Ratio	3.17	>= 0.44

Vitamin Markers

		Reference Range
α-Ketoadipic Acid	1.1	<= 1.7
α-Ketoisovaleric Acid	0.55	<= 0.97
α-Ketoisocaproic Acid	0.69	<= 0.89
α-Keto-β-Methylvaleric Acid	1.3	<= 2.1
Formiminoglutamic Acid (FIGlu)	1.4	<= 1.5
Glutaric Acid	0.35	<= 0.51
Isovalerylglycine	4.7	<= 3.7
Methylmalonic Acid	1.3	<= 1.9
Xanthurenic Acid	1.64	<= 0.96
3-Hydroxypropionic Acid	8	5-22
3-Hydroxyisovaleric Acid	13	<= 29

Toxin & Detoxification Markers

		Reference Range
α-Ketophenylacetic Acid (from Styrene)	0.32	<= 0.46
α-Hydroxyisobutyric Acid (from MTBE)	4.4	<= 6.7
Orotic Acid	0.52	0.33-1.01
Pyroglutamic Acid	29	16-34

Tyrosine Metabolism

		Reference Range
Homogentisic Acid	15	<= 19
2-Hydroxyphenylacetic Acid	0.43	<= 0.76

Metabolic Analysis Reference Ranges are Age Specific

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.

Amino Acids (Urine FMV)

All biomarkers reported in micromol/gm creatinine unless otherwise noted.

Nutritionally Essential Amino Acids

Amino Acid		Reference Range
Arginine	12	10-64
Histidine	493	296-1,136
Isoleucine	37	24-58
Leucine	67	30-87
Lysine	52	45-286
Methionine	50	30-82
Phenylalanine	37	26-71
Taurine	795	68-538
Threonine	84	65-252
Tryptophan	50	28-111
Valine	27	23-61

Nonessential Protein Amino Acids

Amino Acid		Reference Range
Alanine	128	146-486
Asparagine	65	49-182
Aspartic Acid	44	35-86
Cysteine	225	21-78
Cystine	21	26-78
γ-Aminobutyric Acid	3	<= 31
Glutamic Acid	55	5-21
Glutamine	193	172-570
Proline	6	2-18
Tyrosine	40	33-124

Creatinine Concentration

		Reference Range
Creatinine ◆	13.4	3.1-19.5 mmol/L

Amino Acid Reference Ranges are Age Specific

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.

Intermediary Metabolites

B Vitamin Markers

		Reference Range
α-Aminoadipic Acid	52	11-73
α-Amino-N-butyric Acid	16	9-49
β-Aminoisobutyric Acid	89	22-192
Cystathionine	3	6-33
3-Methylhistidine	315	131-318

Urea Cycle Markers

		Reference Range
Ammonia	35.8	14.0-49.0 mmol/g creatinine
Citrulline	39	12-45
Ornithine	18	4-21
Urea ◆	330	168-465 mmol/g creatinine

Glycine/Serine Metabolites

		Reference Range
Glycine	835	639-3,306
Serine	251	187-568
Ethanolamine	199	208-514
Phosphoethanolamine	28	18-70
Phosphoserine	28	28-63
Sarcosine	36	<= 48

Dietary Peptide Related Markers

		Reference Range
Anserine (dipeptide)	30	7-126
Carnosine (dipeptide)	37	10-104
1-Methylhistidine	1,225	92-1,046
β-Alanine	7	<= 21

Markers for Urine Representativeness

		Reference Range
Glutamine/Glutamate	4	>= 10
Ammonia	35.8	14.0-49.0 mmol/g creatinine
Arginine/Ornithine	0.7	>= 1.1

Urine Representativeness Index	5	Ref Range 5 – 10

Essential and Metabolic Fatty Acids Markers (RBCs)

Omega 3 Fatty Acids

Analyte (cold water fish, flax, walnut)		Reference Range
α-Linolenic (ALA) 18:3 n3	0.12	>= 0.09 wt %
Eicosapentaenoic (EPA) 20:5 n3	1.85	>= 0.16 wt %
Docosapentaenoic (DPA) 22:5 n3	1.83	>= 1.14 wt %
Docosahexaenoic (DHA) 22:6 n3	5.8	>= 2.1 wt %
% Omega 3s	9.6	>= 3.8

Omega 9 Fatty Acids

Analyte (olive oil)		Reference Range
Oleic 18:1 n9	12	10-13 wt %
Nervonic 24:1 n9	3.4	2.1-3.5 wt %
% Omega 9s	15.9	13.3-16.6

Saturated Fatty Acids

Analyte (meat, dairy, coconuts, palm oils)		Reference Range
Palmitic C16:0	19	18-23 wt %
Stearic C18:0	18	14-17 wt %
Arachidic C20:0	0.26	0.22-0.35 wt %
Behenic C22:0	0.87	0.92-1.68 wt %
Tricosanoic C23:0	0.26	0.12-0.18 wt %
Lignoceric C24:0	2.5	2.1-3.8 wt %
Pentadecanoic C15:0	0.09	0.07-0.15 wt %
Margaric C17:0	0.29	0.22-0.37 wt %
% Saturated Fats	41.2	39.8-43.6

Omega 6 Fatty Acids

Analyte (vegetable oil, grains, most meats, dairy)		Reference Range
Linoleic (LA) 18:2 n6	14.9	10.5-16.9 wt %
γ-Linolenic (GLA) 18:3 n6	0.05	0.03-0.13 wt %
Dihomo-γ-linolenic (DGLA) 20:3 n6	0.88	>= 1.19 wt %
Arachidonic (AA) 20:4 n6	15	15-21 wt %
Docosatetraenoic (DTA) 22:4 n6	1.29	1.50-4.20 wt %
Eicosadienoic 20:2 n6	0.25	<= 0.26 wt %
% Omega 6s	32.1	30.5-39.7

Monounsaturated Fats

Omega 7 Fats		Reference Range
Palmitoleic 16:1 n7	0.18	<= 0.64 wt %
Vaccenic 18:1 n7	0.79	<= 1.13 wt %
Trans Fat		
Elaidic 18:1 n9t	0.29	<= 0.59 wt %

Delta - 6 Desaturase Activity

	Upregulated Functional Impaired	
Linoleic / DGLA 18:2 n6 / 20:3 n6	16.9	6.0-12.3

Cardiovascular Risk

Analyte		Reference Range
Omega 6s / Omega 3s	3.3	3.4-10.7
AA / EPA 20:4 n6 / 20:5 n3	8	12-125
Omega 3 Index	7.6	>= 4.0

The Essential Fatty Acid reference ranges are based on an adult population.

Fatty Acid Metabolism

Omega 3 Family

α-Linolenic Acid
flax, walnut, grasses
0.12

Stearidonic acid

Eicosatetraenoic acid, ETA

Eicosapentaenoic Acid
cold water fish
1.85
Anti-inflammatory Eicosanoids

Docosapentaenoic Acid
1.83

Docosahexaenoic Acid
cold water fish
5.8

Omega 6 Family

Linoleic Acid
grains, vegetable oils
14.9

γ-Linolenic Acid
evening primrose, borage, black currant
0.05

Dihomo-γ-Linolenic Acid
0.88
Series 1 Prostaglandins Anti-inflammatory

Arachidonic Acid
animal fats
15
Pro-inflammatory Eicosanoids

Docosatetraenoic Acid
1.29

Delta-6 Desaturase
Vitamin and Mineral Cofactors:
FAD (B2), Niacin (B3)
Pyridoxal-5-phosphate (B6)
Vitamin C, Insulin, Zn, Mg

Elongase
Vitamin and Mineral Cofactors:
Niacin (B3)
Pyridoxal-5-phosphate (B6)
Pantothenic Acid (B5)
Biotin, Vitamin C

Delta-5 Desaturase
Vitamin and Mineral Cofactors:
FAD (B2), Niacin (B3)
Pyridoxal-5-phosphate (B6)
Vitamin C, Insulin, Zn, Mg

Elongase
Vitamin and Mineral Cofactors:
Niacin (B3)
Pyridoxal-5-phosphate (B6), Biotin
Pantothenic Acid (B5), Vitamin C

Elongase
Delta-6 Desaturase
Vitamin and Mineral Cofactors:
FAD (B2), Niacin (B3)
Pyridoxal-5-phosphate (B6), Biotin
Vitamin C, Zn, Mg, Carnitine
Pantothenic Acid (B5)

This test was developed and its performance characteristics determined by Genova Diagnostics, Inc. It has not been cleared by the U.S. Food and Drug Administration.

Oxidative Stress Markers

Oxidative Stress Markers

		Reference Range
Glutathione (whole blood)	510	>=669 micromol/L
Lipid Peroxides (urine)	6.5	<=10.0 micromol/g Creat.
8-OHdG (urine)	8	<=16 mcg/g Creat.
Coenzyme Q10, Ubiquinone (plasma)	0.35	0.43-1.49 mcg/mL

The Oxidative Stress reference ranges are based on an adult population.

Vitamin D (Serum)

	Inside Range	Outside Range	Reference Range
25 - OH Vitamin D ◆		32	50-100 ng/mL

Deficiency = < 20 ng/mL (< 50 nmol/L)
Insufficiency = 20-49 ng/mL (50-124 nmol/L)
Optimal = 50-100 ng/mL (125-250 nmol/L)
Excessive = > 100 ng/mL (> 250 nmol/L)

Elemental Markers (RBCs)

Nutrient Elements

Element	Reference Range	Reference Range
Copper	0.541	0.466-0.721 mcg/g
Magnesium	47.9	30.1-56.5 mcg/g
Manganese	0.022	0.007-0.038 mcg/g
Potassium	3,546	2,220-3,626 mcg/g
Selenium	0.53	0.25-0.76 mcg/g
Zinc	11.8	7.8-13.1 mcg/g

Toxic Elements

Element	Reference Range	Reference Range
Lead	0.017	<= 0.048 mcg/g
Mercury	0.0049	<= 0.0039 mcg/g
Antimony	0.001	<= 0.002 mcg/g
Arsenic	0.019	<= 0.071 mcg/g
Cadmium	0.000	<= 0.001 mcg/g
Tin	<dl	<= 0.0009 mcg/g

The Elemental reference ranges are based on an adult population.

Lab Comments

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.

Homocysteine (Plasma)

GENOVA DIAGNOSTICS EUROPE

Parkgate House
356 West Barnes Lane
New Malden, Surrey KT3 6NB

63 Zillicoa Street
Asheville, NC 28801 USA

Patient: **JANE DOE**
DOB: March 29, 1978
Sex: F

Order Number: K000000
Completed: August 16, 2016 15:52
Received: August 03, 2016 08:39
Collected: August 03, 2016 03:05

Homocysteine

	Inside Range	Outside Range	Reference Range
Homocysteine	9.65		3.70-10.40 umol/L

Commentary

The reference range for homocysteine is based on the sex-specific 5th to 95th percentile values for men and women (20 to 39 years of age) in the NHANES nutritionally replete cohort. Annals of Internal Medicince 1999; 131 (331-338).

Commentary is provided to the practitioner for educational purposes, and should not be interpreted as diagnostic or treatment recommendations. Diagnosis and treatment decisions are the responsibility of the practitioner.

Homocysteine is WITHIN the REFERENCE range. As elevated homocysteine is a factor which increases cardiovascular risk, normal levels are highly desirable and beneficial. Continued attention to nutritional influences such as vitamin B6, B12 and folic acid will help maintain this level.