



**Genova  
Diagnostics®**

*Innovative Testing for Optimal Health*

63 Zillico Street  
Asheville, NC 28801  
© Genova Diagnostics

Patient: **JOHN**

**DOE**

DOB: June 01, 2006

Sex: M

MRN:

**Order Number: D5240143**

Completed: March 24, 2011

Received: March 14, 2011

Collected: March 13, 2011

### Results Overview

Normal	Borderline	High Need	Supplementation for High Need
<b>Antioxidants</b>			
Vitamin A / Carotenoids			
Vitamin C			
Vitamin E / Tocopherols			
<b>B-Vitamins</b>			
Thiamin - B1			
Riboflavin - B2			
Niacin - B3			
Pyridoxine - B6			
Folic Acid - B9			
Cobalamin - B12			
<b>Minerals</b>			
Magnesium			
Manganese			
	Zinc	Molybdenum	Molybdenum - Dose = 75 mcg

SUGGESTED SUPPLEMENT SCHEDULE

Supplements	Daily Recommended Intake (DRI)	Patient's Daily Recommendations	Provider Daily Recommendations
Antioxidants			
Vitamin A / Carotenoids	1,333 IU	1,500 IU	
Vitamin C	25 mg	50 mg	
Vitamin E / Tocopherols	10 IU	50 IU	
B-Vitamins			
Thiamin - B1	0.6 mg	2 mg	
Riboflavin - B2	0.6 mg	2 mg	
Niacin - B3	8 mg	10 mg	
Pyridoxine - B6	0.6 mg	2 mg	
Folic Acid - B9	200 mcg	200 mcg	
Cobalamin - B12	1.2 mcg	10 mcg	
Minerals			
Magnesium	130 mg	150 mg	
Manganese	1.5 mg	2 mg	
Molybdenum	22 mcg	75 mcg	
Zinc	5 mg	10 mg	
Digestive Support			
Pancreatic Enzymes		0 IU	
Amino Acid	mg/day	Amino Acid	mg/day
Arginine	48	Methionine	0
Asparagine	45	Phenylalanine	9
Cysteine	0	Serine	0
Glutamine	0	Taurine	0
Glycine	159	Threonine	11
Histidine	59	Tryptophan	0
Isoleucine	9	Tyrosine	28
Leucine	0	Valine	0
Lysine	298		

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

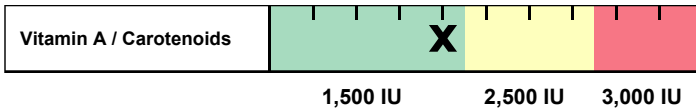
Borderline

High Need

# Amino Acids FMV Interpretation At-A-Glance

## Nutritional Needs

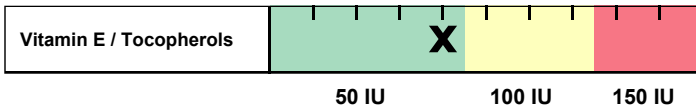
### Antioxidants



- ▶ 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 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.



- ▶ 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.

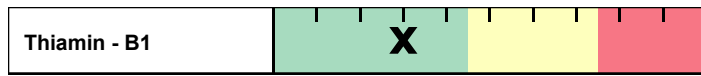
### Key

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

# Amino Acids FMV Interpretation At-A-Glance

## Nutritional Needs

### B-Vitamins



2 mg      5 mg      10 mg

- ▶ 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.



2 mg      5 mg      10 mg

- ▶ 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.



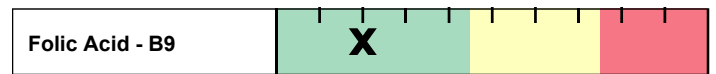
10 mg      20 mg      40 mg

- ▶ 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.



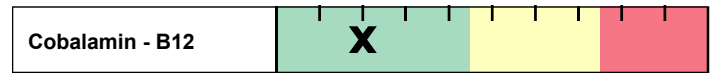
2 mg      5 mg      10 mg

- ▶ 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.



200 mcg      300 mcg      400 mcg

- ▶ 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.



10 mcg      50 mcg      100 mcg

- ▶ 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.

# Amino Acids FMV Interpretation At-A-Glance

## Nutritional Needs

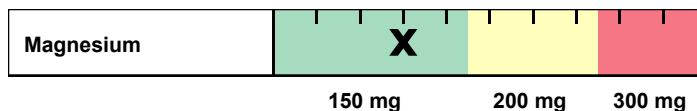
### Minerals



- ▶ 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.



- ▶ 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).

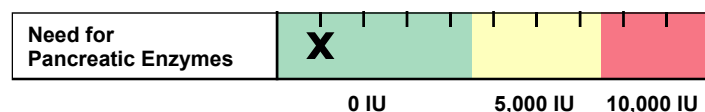


- ▶ Magnesium is involved in >300 metabolic reactions. Key areas include energy production, bone & ATP formation, muscle & nerve conduction and cell signaling.
- ▶ Deficiency may occur with malabsorption, alcoholism, hyperparathyroidism, renal disorders (wasting), diabetes, diuretics, digoxin or high 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.



- ▶ 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.

## Digestive Support



- ▶ 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.

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

Amino Acids (FMV)

Nutritionally Essential Amino Acids

Amino Acid	Reference Range
Arginine	31 35-159
Histidine	531 491-3,392
Isoleucine	59 48-150
Leucine	89 65-191
Lysine	63 149-1,522
Methionine	148 59-167
Phenylalanine	85 69-188
Taurine	3,744 274-1,607
Threonine	204 132-639
Tryptophan	125 72-308
Valine	73 44-147

Nonessential Protein Amino Acids

Amino Acid	Reference Range
Alanine	318 181-878
Asparagine	99 100-508
Aspartic Acid	70 112-186
Cysteine	156 50-376
Cystine	31 50-126
γ-Aminobutyric Acid	13 <= 109
Glutamic Acid	42 7-74
Glutamine	807 308-1,210
Proline	11 6-35
Tyrosine	96 72-333

Creatinine Concentration

Reference Range
Creatinine ♦ 5.6 3.1-19.5 mmol/L

The performance characteristics of all assays have been verified by Genova Diagnostics, Inc. Unless otherwise noted with ♦ as cleared by the U.S. Food and Drug Administration, assays are For Research Use Only.

Intermediary Metabolites

B Vitamin Markers	Reference Range
α-Aminoadipic Acid	92 23-180
α-Amino-N-butyric Acid	30 24-108
β-Aminoisobutyric Acid	103 28-550
Cystathionine	6 13-71
3-Methylhistidine	232 107-554

Urea Cycle Markers

Ammonia	20.9 25.0-88.0 mmol/g creatinine
Citrulline	35 28-117
Ornithine	12 6-56
Urea ♦	681 223-918 mmol/g creatinine

Glycine/Serine Metabolites

Glycine	1,142 1,058-4,772
Serine	671 306-1,093
Ethanolamine	688 262-945
Phosphoethanolamine	124 45-197
Phosphoserine	113 51-145
Sarcosine	71 <= 183

Dietary Peptide Related Markers

Reference Range
Anserine (dipeptide) 3 23-483
Carnosine (dipeptide) 111 39-432
1-Methylhistidine 171 144-2,122
β-Alanine 13 <= 46

Markers for Urine Representativeness

Reference Range
Glutamine/Glutamate 19 >= 7
Ammonia 20.9 25.0-88.0 mmol/g creatinine
Arginine/Ornithine 2.6 >= 1.1

