



Patient: **SAMPLE**
PATIENT

DOB:
Sex:
MRN:

Results Overview

Normal	Borderline	High Need	Supplementation for High Need
Antioxidants			
Vitamin A / Carotenoids			
Vitamin C			
Vitamin E / Tocopherols			
B-Vitamins			
Thiamin - B1			
Riboflavin - B2			
Niacin - B3			
	Pyridoxine - B6		
		Folic Acid - B9	Folic Acid - B9 - Dose = 400 mcg
	Cobalamin - B12		
Minerals			
	Magnesium		
Manganese			
Molybdenum			
Zinc			

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	5 mg	
Folic Acid - B9	200 mcg	400 mcg	
Cobalamin - B12	1.2 mcg	50 mcg	
Minerals			
Magnesium	130 mg	200 mg	
Manganese	1.5 mg	1.5 mg	
Molybdenum	22 mcg	25 mcg	
Zinc	5 mg	5 mg	
Digestive Support			
Pancreatic Enzymes		0 IU	
Amino Acid		Amino Acid	
	mg/day		mg/day
Arginine	0	Methionine	0
Asparagine	0	Phenylalanine	0
Cysteine	44	Serine	0
Glutamine	0	Taurine	62
Glycine	0	Threonine	0
Histidine	0	Tryptophan	0
Isoleucine	0	Tyrosine	0
Leucine	0	Valine	0
Lysine	0		

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.

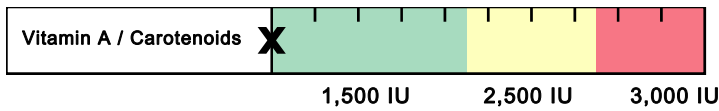
Key

	Normal
	Borderline
	High Need

Amino Acids FMV Interpretation At-A-Glance

Nutritional Needs

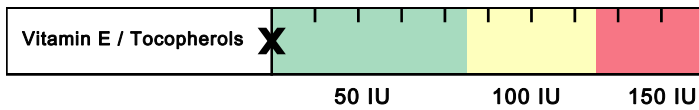
Antioxidants



- ▶ 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.

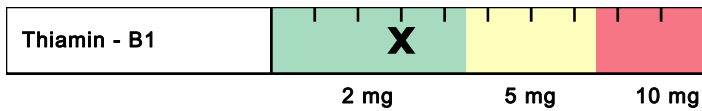
Key

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

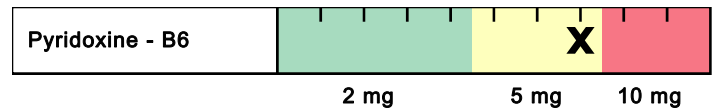
Amino Acids FMV Interpretation At-A-Glance

Nutritional Needs

B-Vitamins



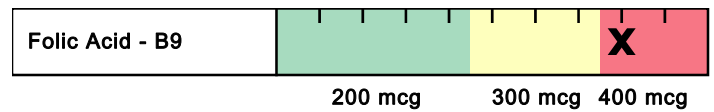
- ▶ B1 is a required cofactor for enzymes involved in energy production from food, and for the synthesis of ATP, GTP, DNA, RNA and NADPH.
- ▶ Low B1 can result from chronic alcoholism, diuretics, digoxin, oral contraceptives and HRT, or large amounts of tea & coffee (contain anti-B1 factors).
- ▶ B1 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.



- ▶ 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.



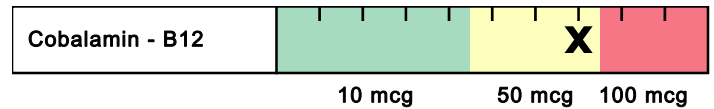
- ▶ B2 is a key component of enzymes involved in antioxidant function, energy production, detoxification, methionine metabolism and vitamin activation.
- ▶ Low B2 may result from chronic alcoholism, some anti-psychotic medications, oral contraceptives, tricyclic antidepressants, quinacrine or adriamycin.
- ▶ 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.



- ▶ 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.



- ▶ 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.



- ▶ 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.

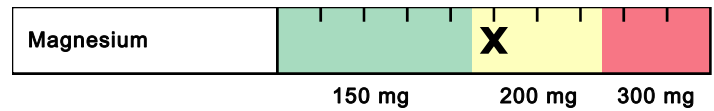
Amino Acids FMV Interpretation At-A-Glance

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.



- ▶ 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.

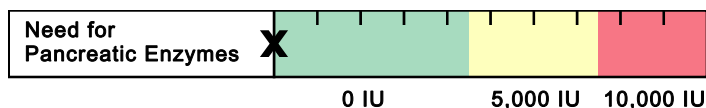


- ▶ Molybdenum is a cofactor for enzymes that convert sulfites to sulfate, and nucleotides to uric acid, and that help metabolize aldehydes & other toxins.
- ▶ Low Mo levels may result from long-term TPN that does not include Mo.
- ▶ Mo deficiency may result in increased sulfite, decreased plasma uric 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 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.

Amino Acids (Urine FMV)

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

Nutritionally Essential Amino Acids

Amino Acid	Reference Range
Arginine	29 (8-59)
Histidine	714 (218-2,114)
Isoleucine	19 (10-44)
Leucine	53 (26-109)
Lysine	117 (25-320)
Methionine	18 (7-39)
Phenylalanine	123 (33-188)
Taurine	241 (80-1,560)
Threonine	132 (31-246)
Tryptophan	47 (24-113)
Valine	48 (26-88)

Nonessential Protein Amino Acids

Amino Acid	Reference Range
Alanine	393 (78-560)
Asparagine	211 (44-360)
Aspartic Acid	20 (<= 19)
Cysteine (FMV urine)	23 (12-98)
Cystine (FMV Urine)	65 (27-148)
γ-Aminobutyric Acid	3 (<= 5)
Glutamic Acid	35 (10-36)
Glutamine	>UL (162-1,290)
Proline	8 (3-24)
Tyrosine	153 (61-410)

Creatinine Concentration

Reference Range
Creatinine ♦ 13.3 (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 assays have not been cleared by the U.S. Food and Drug Administration.

Methodology: LC/MS/MS, Enzymatic and Alkaline Picrate

Intermediary Metabolites

B Vitamin Markers	Reference Range
α-Amino adipic	68 (13-87)
α-Amino-N-butyric Acid	23 (6-49)
β-Aminoisobutyric Acid	297 (5-284)
Cystathionine	>UL (4-106)
3-Methylhistidine	434 (75-456)

Urea Cycle Markers

Citrulline	4.0 (0.6-8.5)
Ornithine	14 (5-21)
Urea ♦	549 (196-711 mmol/g creatinine)

Glycine/Serine Metabolites

Glycine	>UL (118-907)
Serine	225 (61-295)
Ethanolamine	136 (74-286)
Phosphoethanolamine	8 (4-27)
Phosphoserine	11 (3-23)
Sarcosine	1.0 (<= 0.9)

Dietary Peptide Related Markers

Reference Range
Anserine (dipeptide) 24.7 (1.0-268.1)
Carnosine (dipeptide) 72 (7-318)
1-Methylhistidine 640 (28-1,985)
β-Alanine 13 (<= 29)

Step 3:

Ship the specimen to the lab

Specimen must be returned in the Genova Diagnostics kit box for correct delivery to the lab. Please refer to the shipping instruction insert found in your kit box.

- Plan to ship the specimen Monday – Thursday overnight delivery
- Call 1.800.GoFedEx (1.800.463.3339) to schedule shipping. When the automated system asks “How may I help you?” say “Return a Package”. Tell the FedEx representative “I am using a billable stamp” and they will walk you through the process and make it easy.
- **Make sure the tubes are tightly closed and identified** with completed labels. Seal the tubes in the Biohazard bag.
- **Place the Biohazard bag and the frozen gel pack** in the Flexfoil pack. Then seal the Flexfoil pack by removing the white strip over the adhesive line and folding flap over.
- **Place Flexfoil pack (with specimens) inside kit box** and **place completed and signed requisition** on top before closing. *Do not staple or tape the box.*
- **Print your name and address** in the section marked “From” on the prepaid shipping envelope label. *DO NOT mark or write in any other sections.*
- Put the kit box into the envelope and seal the envelope.
- Keep your shipment and tracking numbers for future reference and tracking purposes.



GENOVA
DIAGNOSTICS®

Amino Acid Analysis, FMV

IS-3685

Patient Instructions for Urine Collection



Check Your Kit

- A - 1 Disposable plastic cup
- B - 1 Green-top preservative tube
- C - 2 Collection labels
- D - 1 Clear top transfer tube
- E - 1 Biohazard bag with absorbent pad
- F - 1 Glove
- G - 1 Pipette
- H - 1 Gel freezer pack
- I - 1 Flexfoil pack
- J - 1 Requisition (to be completed and signed)
- K - 1 Prepaid mailing envelope

- If any items are missing or expired, call Client Services at 800.522.4762 and press “1”.
- Keep the kit box for shipping your specimen to the lab.

GENOVA
DIAGNOSTICS®

63 Zillicoa Street
Asheville, NC 28801
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IS-3685,n,pi,b-307-u,091615

Step 1:

Important things to know and consider

- Abnormal kidney function or use of diuretics may influence test results. This test should not be performed on individuals with kidney disorders. In addition, certain medicines may impact test results (e.g. Bactrim, Tagamet). Let your physician know about your use of these medications. Do not change use of medications unless instructed to do so by your healthcare provider.

Schedule & Prepare for your urine collection

- Schedule to **begin the test Sunday through Thursday only**, to ensure weekday delivery to the laboratory.
- **Refer to the shipping instruction insert for specimen shipment instructions.** *Specimens must be frozen prior to shipment and received by the laboratory within 48 hours of collection.*
- **Freeze the enclosed gel freezer pack** a minimum of 4 hours before shipping.
- **4 days before the test discontinue all non-essential medications**, including acetaminophen and all over-the-counter cold remedies, all vitamins, minerals and amino acids – including creatine, enhanced sports drinks and vitamin waters, all herbal supplements, adrenal steroids, corticosteroids, antihistamines, penicillins or D-penicillamine, aminoglycoside antibiotics, cephalosporin-C, cephamycins, amphetamines, and phenothiazine derivatives, *unless instructed otherwise by your physician.*
- **On the day of collection avoid foods and drinks containing aspartame** (sugar substitutes such as Equal® or Nutrasweet®). Otherwise, eat your usual diet and consume liquids as you would normally.
- **CAUTIONS:** A very small amount of Sulfosalicylic Acid is contained in the tube as a preservative. Avoid contact of the eyes or skin with the fluid in the tube. *For eye contact, wash thoroughly for 15 minutes. For skin contact, wash thoroughly with soap and water.* Do not inhale or ingest powder.
- Test cannot be performed on patients 13 months of age or younger.
- Female patients should not collect urine during a menstrual period.
- **Complete the Requisition Form** with all patient and billing information. Be sure it is signed by the Patient/Responsible Party and the healthcare provider. *Enter date in box labeled "Date Final Sample Collected"*

Step 2:

Collecting your urine specimen

Not following these instructions may affect your test results.



- 1 Write your full name, time, and date of collection** on the both collection labels using a ballpoint pen or pencil only, and *place the labels on the green-top tube and the clear top tube.*



- 2 After awakening for the day (after 6 to 8 hours sleep), collect your first morning urine in the collection cup** provided in your kit. *After filling the cup, pass any additional urine into the toilet. (Note: If you wake up to urinate during the night within six hours before your rising time, collect your urine and refrigerate it; then add that refrigerated sample to the urine you collect when you rise for the day.)*



- 3 Use the pipette to transfer urine** from the collection cup into the *clear top tube* to reach the 5ml mark. Screw top on the tube tightly.



- 4 Use the pipette to transfer urine** from the collection cup into the *green top tube* to reach the 12ml mark. Screw top on the tube tightly.



- 5 Recap the tube tightly and shake** it to mix thoroughly. Discard the remaining urine, the collection cup, the pipette, and the glove.



- 6 Place the filled tubes into the biohazard bag** and freeze a minimum of 2 hours prior to shipping. Keep samples frozen until ready for shipping.

Consult your healthcare provider if you have any questions at any time during this test.