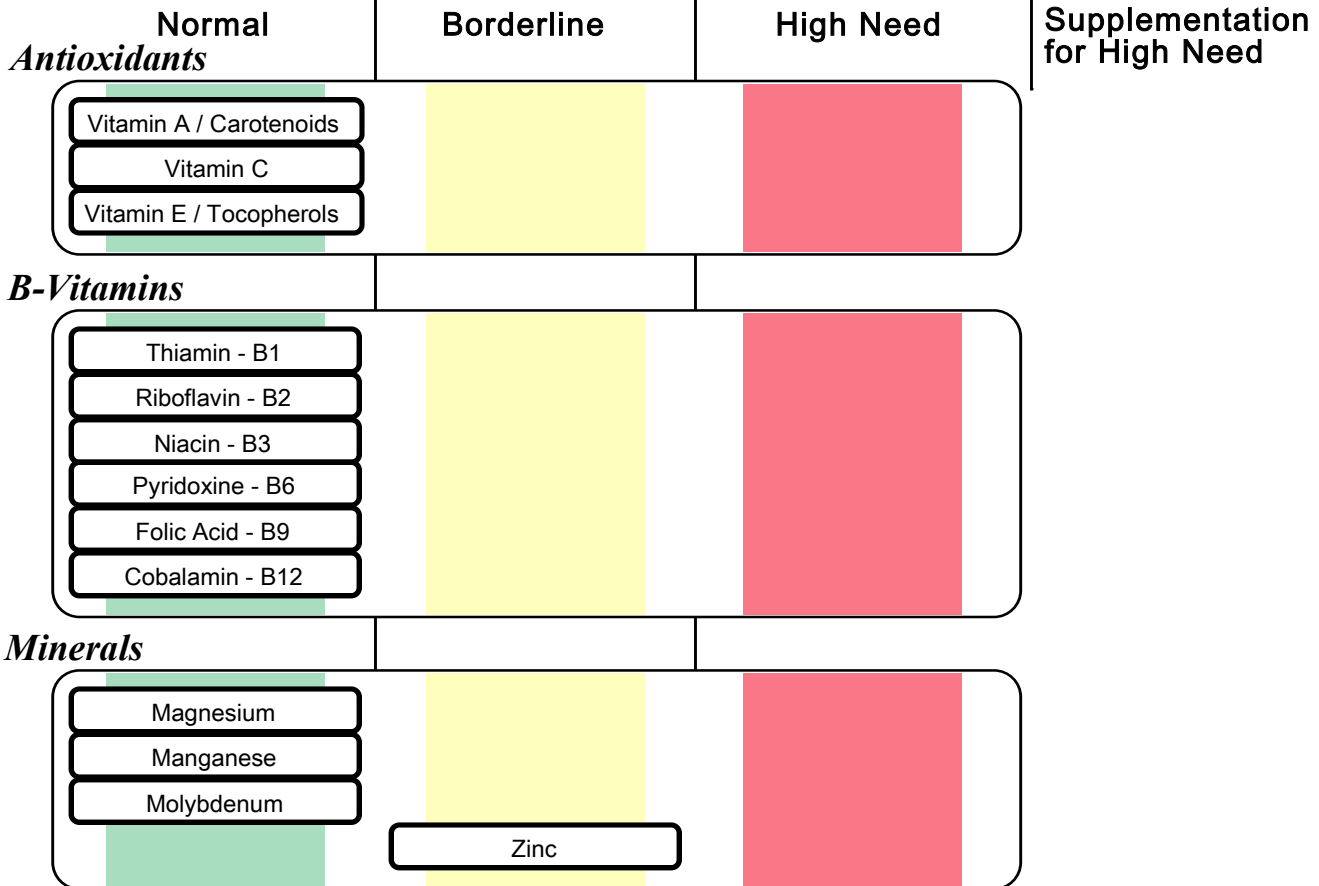




Patient: Sample Patient

## Results Overview



### SUGGESTED SUPPLEMENT SCHEDULE

Supplements	Daily Recommended Intake (DRI)	Patient's Daily Recommendations	Provider Daily Recommendations
<b>Antioxidants</b>			
Vitamin A / Carotenoids	2,333 IU	3,000 IU	
Vitamin C	75 mg	250 mg	
Vitamin E / Tocopherols	22 IU	100 IU	
<b>B-Vitamins</b>			
Thiamin - B1	1.1 mg	10 mg	
Riboflavin - B2	1.1 mg	10 mg	
Niacin - B3	14 mg	20 mg	
Pyridoxine - B6	1.5 mg	10 mg	
Folic Acid - B9	400 mcg	400 mcg	
Cobalamin - B12	2.4 mcg	100 mcg	
<b>Minerals</b>			
Magnesium	320 mg	400 mg	
Manganese	1.8 mg	3.0 mg	
Molybdenum	45 mcg	75 mcg	
Zinc	8 mg	20 mg	
<b>Digestive Support</b>			
Pancreatic Enzymes		0 IU	
<b>Amino Acid</b>		<b>Amino Acid</b>	
	<b>mg/day</b>		<b>mg/day</b>
Arginine	473	Methionine	0
Asparagine	0	Phenylalanine	52
Cysteine	165	Serine	0
Glutamine	64	Taurine	40
Glycine	0	Threonine	0
Histidine	0	Tryptophan	0
Isoleucine	200	Tyrosine	196
Leucine	415	Valine	291
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.

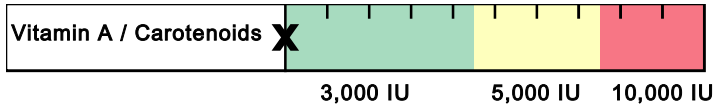
**Key**

	Normal		Borderline		High Need
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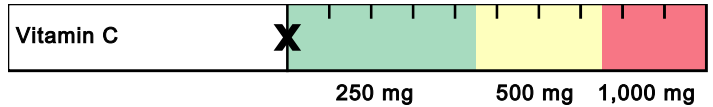
# Amino Acids, Plasma Interpretation At-A-Glance

## Nutritional Needs

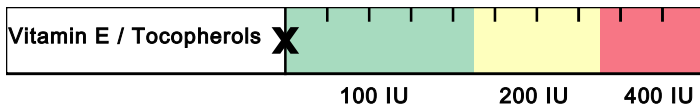
### Antioxidants



- ▶ 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 gingival, 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, Plasma Interpretation At-A-Glance

## Nutritional Needs

### B-Vitamins



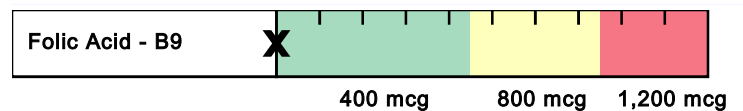
- ▶ B1 is a required cofactor for enzymes involved in energy production from food and in the synthesis of ATP, GTP, DNA, RNA and NADPH.
- ▶ Low B1 can result from chronic alcoholism, diuretics, digoxin, oral contraceptives and HRT or large amounts of tea & coffee (contain anti-B1 factors).
- ▶ B1 deficiency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



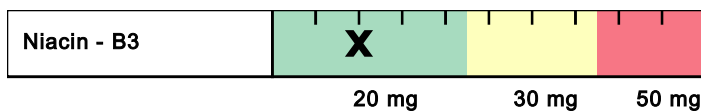
- ▶ B6 (as P5P) is a cofactor for enzymes involved in glycogenolysis & gluconeogenesis and synthesis of neurotransmitters, heme, B3, RBCs and nucleic acids.
- ▶ Low B6 may result from chronic alcoholism, long-term diuretics, estrogens (oral contraceptives and HRT), anti-TB meds, penicillamine, L-DOPA, 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.



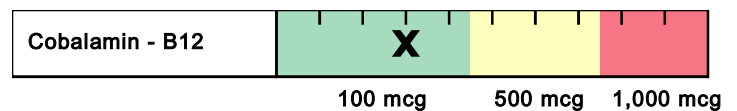
- ▶ B2 is a key component of enzymes involved in antioxidant function, energy production, detoxification, methionine metabolism and vitamin activation.
- ▶ Low B2 may result from chronic alcoholism, some anti-psychotic medications, oral contraceptives, tricyclic antidepressants, quinacrine or adriamycin.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

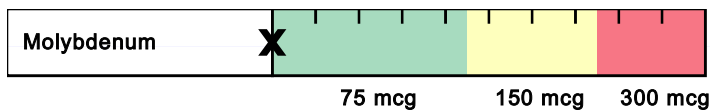
# Amino Acids, Plasma Interpretation At-A-Glance

## Nutritional Needs

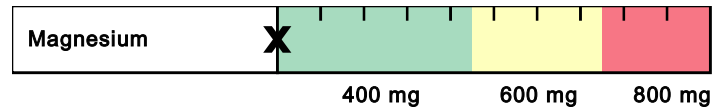
### Minerals



- ▶ 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).

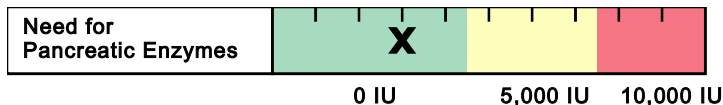


- ▶ Mg is involved in >300 metabolic reactions. Key areas include energy production, bone & ATP formation, muscle & nerve conduction and cell signaling.
- ▶ Deficiency may occur with malabsorption, alcoholism, hyperparathyroidism, renal disorders (wasting), diabetes, diuretics, digoxin or high doses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

# Amino Acids (Plasma)

All biomarkers reported in micromoles per deciliter unless stated otherwise.

Nutritionally Essential Amino Acids		
Amino Acid	Reference Range	
Arginine	6.0-17.5	4.4
Histidine	6.5-13.3	7.7
Isoleucine	5.79-18.69	6.54
Leucine	12.1-36.1	12.0
Lysine	13.7-34.7	17.3
Methionine	2.3-6.5	3.2
Phenylalanine	6.07-17.46	7.32
Taurine	4.41-10.99	5.26
Threonine	6.42-16.32	9.00
Tryptophan	2.65-6.67	4.46
Valine	18.3-42.6	16.8

Nonessential Protein Amino Acids		
Amino Acid	Reference Range	
Alanine	23-62	25
Asparagine	3.5-11.6	5.3
Aspartic Acid	<= 0.67	<dl
Cyst(e)ine	5.9-19.9	5.9
γ-Aminobutyric Acid	<= 0.06	0.05
Glutamic Acid	2.0-14.5	4.6
Glutamine	44-111	53
Proline	15-57	26
Tyrosine	6.2-18.5	6.5

Intermediary Metabolites		
B Vitamin Markers	Reference Range	
α-Amino adipic Acid	<= 0.28	0.12
α-Amino-N-butyric Acid	1.76-9.99	3.00
β-Aminoisobutyric Acid	<= 0.72	0.17
Cystathionine	<= 0.09	0.04
3-Methylhistidine	<= 0.78	0.28

Urea Cycle Markers		
Citrulline	1.6-5.7	1.8
Ornithine	4.38-15.42	8.26
Urea	216-1,156	341

Glycine/Serine Metabolites		
Glycine	5-23	14
Serine	2.1-7.0	5.5
Ethanolamine	0.19-0.78	0.31
Phosphoethanolamine	0.15-0.64	0.26
Phosphoserine	<= 0.39	<dl
Sarcosine	<= 0.15	0.05

Dietary Peptide Related Markers		
	Reference Range	
1-Methylhistidine	<= 1.64	0.31
β-Alanine	<= 0.7	0.3

The methodology for amino acid analysis has been changed to LCMSMS. Please note the reference ranges have been updated.

Methodology: LC/MS/MS

Amino Acid Reference Ranges are age specific.

The performance characteristics of all assays have been verified by Genova Diagnostics, Inc. Assays have not been cleared by the U.S. Food and Drug Administration.

# Step 3:

## Ship the specimen to the lab

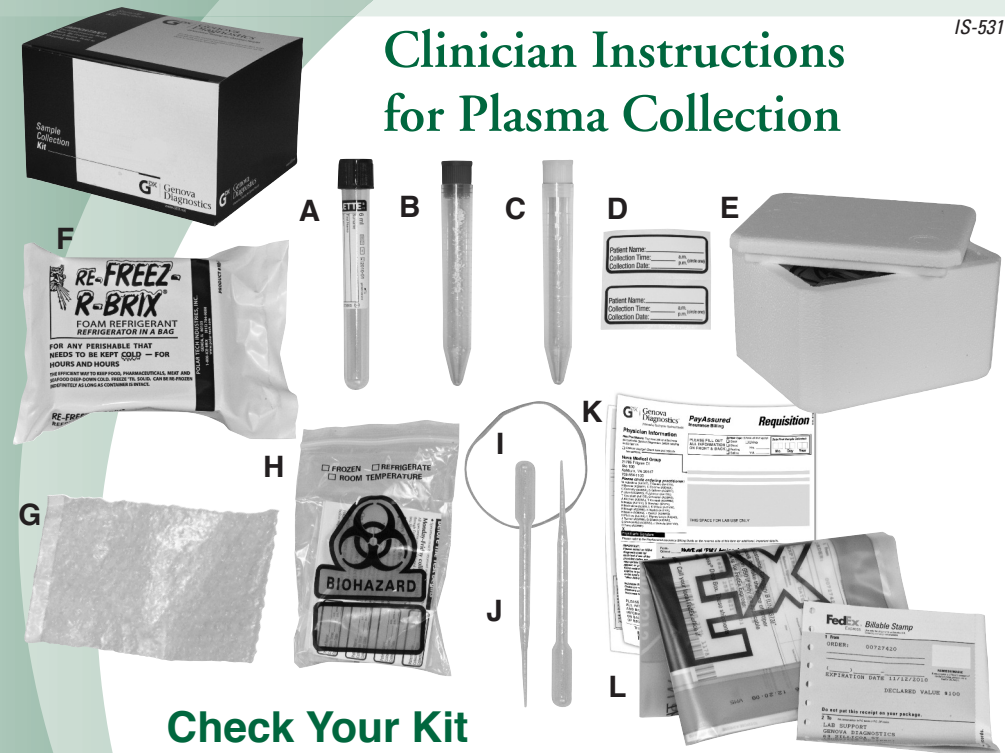
Specimen must be returned in the Genova Diagnostics kit box for correct delivery to the lab. Not following these instructions may result in a shipping charge.

- Plan to ship the specimen Monday – Friday 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 bubble wrap bag and put it into the Biohazard bag, and seal it securely.
- **Lay the Biohazard bag with specimen on top of the freezer brick** in the foam box. Secure the foam box lid with the rubber band.
- **Slide the foam box back inside the kit box**, and place the **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.

# Amino Acids Analysis, Plasma

IS-531

## Clinician Instructions for Plasma Collection



### Check Your Kit

- A - 1 Na Heparin blue-top tube
- B - 1 Blue-top preservative tube
- C - 1 Yellow-top transfer tube
- D - 2 Labels
- E - 1 Foam insulator box
- F - 1 Freezer brick
- G - 1 Bubblewrap bag
- H - 1 Biohazard bag and absorbent pad
- I - 1 Rubber band
- J - 2 Pipettes
- K - 1 Requisition (to be completed and signed)
- L - 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.



# Step 1:

## Important things to know and consider

- Certain medicines may impact test results [e.g. adrenal steroids including corticosteroids, aminoglycoside antibiotics, amphetamines, antihistamines, cephalosporin-C and cephamycins (e.g. Cefoxitin), penicillin or D-penicillamine, and phenothiazine derivatives].
- **4 Days before the test** have the patient discontinue all of the following if medically appropriate: Non-essential medications including acetaminophen and over-the-counter cold remedies; any vitamins, minerals, amino acids, and herbal supplements taken regularly – including enhanced sports drinks, energy drinks, and vitamin waters.
- **24 hrs before the test:** Instruct the patient to avoid eating or drinking any products containing aspartame (Nutra-Sweet, Equal, Spoonful) and monosodium glutamate (MSG), and avoid over-consuming any single food. Otherwise, instruct the patient to eat their usual diet.

## Schedule & Prepare for the blood draw

- **Sample processing** must be completed within 15 minutes after blood draw.
- **Have the patient fast overnight** (at least 12 hours) prior to the blood draw.
- **Contact FedEx and schedule to ship the specimen overnight delivery** Monday - Friday. *Sample must be received within 5 days of collection. Specimen MUST be completely frozen before shipping.*
- **Freeze the enclosed freezer brick** a minimum of 8 hours before shipping.
- **Complete the Requisition Form** with all patient and billing information. Be sure it is signed by the Patient/Responsible Party and the healthcare provider.

# Step 2:

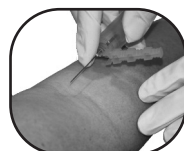
## Blood Draw & Specimen Preparation

Not following these instructions may affect the test results.

**CAUTIONS:** Do not spill, inhale, or ingest the white powder preservative. If the dust should get into your eyes or on your skin, flush with water for at least 15 minutes.



- 1 Write the patient's full name and the time and date** of collection on each label. Attach a label to both the blue-top preservative tube and the yellow-top transfer tube.



- 2 Draw blood** to fill the Na Heparin blue-top tube.



- 3 Mix the blood sample** thoroughly by gently inverting the tube 5-10 times.



- 4 Centrifuge the sample for 15 minutes** at 3000 rpm. *If the sample is visibly hemolyzed, a new sample must be collected.*



- 5 Transfer at least 2-ml plasma** to the blue-top preservative tube. Avoid transferring red cells.



- 6 IMMEDIATELY shake the preservative tube** very hard for at least 10-20 seconds. The sample should turn chunky and white as you mix.



- 7 Centrifuge the preserved tube for 5 minutes** at 2500 rpm. For a tabletop centrifuge, spin for an additional 3-5 minutes. If specimen is cloudy or yellow, shake the sample again very hard and spin until clear.



- 8 Carefully transfer the clear supernatant** into the yellow-top transfer tube, filling to the line shown on the tube (about 0.5-0.75 ml). Discard tube with white precipitate.

- 9 Place the yellow-top transfer tube into the bubblewrap bag. Freeze sample immediately.** Keep sample completely frozen until ready to ship.

- 10 Complete the Requisition:** Enter date in box labeled "Date Final Sample Collected".