

PLASMA AMINO ACIDS



LAB#: B000000-0000-0
PATIENT: Sample Patient
ID: PATIENT-S-00001
SEX: Female
AGE: 29

CLIENT#: 12345
DOCTOR:
Doctor's Data, Inc.
3755 Illinois Ave
St. Charles, IL 60174

SPECIMEN VALIDITY

SPECIMEN MARKERS	RESULT	REFERENCE RANGE	PERCENTILE	
			5 th	32 nd
Glutamine/Glutamate	18	> 8.5		
Asparagine/Aspartate	5.6	> 7.5		
			68 th	95 th
Ammonia	37	< 30		
SPECIMEN VALIDITY INDEX				

ESSENTIAL / CONDITIONALLY INDISPENSABLE AMINO ACIDS

ESSENTIAL AMINO ACIDS	RESULT <small>μmoles/100ml</small>	REFERENCE RANGE	PERCENTILE				
			2.5 th	16 th	50 th	84 th	97.5 th
Methionine	1.8	2- 4					
Taurine	3.3	4.5- 14					
Lysine	13	15- 26					
Threonine	6.6	8- 22					
Tryptophan	3.2	3- 7					
Phenylalanine	5	4- 9					
Leucine	8.4	7.5- 18					
Isoleucine	4.1	3.7- 10					
Valine	16	13- 31					
Arginine	4.2	4.5- 13					
Histidine	7.7	5- 10					

NONESSENTIAL AMINO ACIDS

NONESSENTIAL AMINO ACIDS	RESULT <small>μmoles/100ml</small>	REFERENCE RANGE	PERCENTILE				
			2.5 th	16 th	50 th	84 th	97.5 th
Alanine	19	22- 61					
Aspartate	0.66	0.2- 2					
Asparagine	3.7	3.5- 7.5					
Glutamine	39	40- 70					
Glutamate	2.2	2- 15					
Cystine	3.6	2- 6.5					
Glycine	21	15- 50					
Tyrosine	3.9	4- 10					
Serine	7.7	6- 16					
Proline	6.9	10- 31					



GASTROINTESTINAL MARKERS						
GI MARKERS	RESULT <small>μmoles/100ml</small>	REFERENCE RANGE	PERCENTILE			
			2.5 th	16 th	50 th	84 th 97.5 th
Ethanolamine	0.44	0.2- 1.3				
Threonine	6.6	8- 22				
Tryptophan	3.2	3- 7				
			68 th		95 th	
Alpha-Amino adipate	0.33	< 0.3				
Beta-alanine	0.11	< 0.4				
Beta-aminoisobutyrate	0.055	< 0.2				
Anserine	< dl	< 0.02				
Carnosine	0.055	< 0.02				
Gamma-aminobutyrate	< dl	< 0.02				
Hydroxyproline	1.1	< 2.7				

MAGNESIUM DEPENDANT MARKERS						
MAGNESIUM MARKERS	RESULT <small>μmoles/100ml</small>	REFERENCE RANGE	PERCENTILE			
			2.5 th	16 th	50 th	84 th 97.5 th
Citrulline	2.9	1.6- 6				
Ethanolamine	0.44	0.2- 1.3				
Phosphoethanolamine	0.22	0.05- 0.5				
Phosphoserine	0.43	0.3- 1.2				
Serine	7.7	6- 16				
Taurine	3.3	4.5- 14				
			68 th		95 th	
Methionine Sulfoxide	< dl	< 0.02				

B6, B12, & FOLATE DEPENDANT MARKERS						
B-VITAMIN MARKERS	RESULT <small>μmoles/100ml</small>	REFERENCE RANGE	PERCENTILE			
			2.5 th	16 th	50 th	84 th 97.5 th
Cystine	3.6	2- 6.5				
Alpha amino-N-butyrate	1.3	0.8- 3.3				
Histidine	7.7	5- 10				
Serine	7.7	6- 16				
			68 th		95 th	
Cystathionine	< dl	< 0.1				
Alpha-amino adipate	0.33	< 0.3				
Beta-aminoisobutyrate	0.055	< 0.2				
Beta-alanine	0.11	< 0.4				
Homocystine	< dl	< 0.02				
Sarcosine	0.055	< 0.3				
1-Methylhistidine	1.4	< 2				
3-Methylhistidine	0.055	< 0.6				



DETOXIFICATION MARKERS						
DETOX MARKERS	RESULT <small>μmoles/100ml</small>	REFERENCE RANGE	PERCENTILE			
			2.5 th	16 th	50 th	84 th 97.5 th
Methionine	1.8	2- 4	[Bar chart showing result at 2.5th percentile]			
Cystine	3.6	2- 6.5	[Bar chart showing result at 50th percentile]			
Taurine	3.3	4.5- 14	[Bar chart showing result at 2.5th percentile]			
Glutamine	39	40- 70	[Bar chart showing result at 2.5th percentile]			
Glycine	21	15- 50	[Bar chart showing result at 16th percentile]			
Aspartate	0.66	0.2- 2	[Bar chart showing result at 50th percentile]			

NEUROLOGICAL MARKERS						
NEUROLOGICAL MARKERS	RESULT <small>μmoles/100ml</small>	REFERENCE RANGE	PERCENTILE			
			2.5 th	16 th	50 th	84 th 97.5 th
Glutamine	39	40- 70	[Bar chart showing result at 2.5th percentile]			
Phenylalanine	5	4- 9	[Bar chart showing result at 50th percentile]			
Tyrosine	3.9	4- 10	[Bar chart showing result at 2.5th percentile]			
Tryptophan	3.2	3- 7	[Bar chart showing result at 16th percentile]			
Taurine	3.3	4.5- 14	[Bar chart showing result at 2.5th percentile]			
Cystine	3.6	2- 6.5	[Bar chart showing result at 50th percentile]			
			68 th		95 th	
Beta-alanine	0.11	< 0.4	[Bar chart showing result at 2.5th percentile]			
Cystathionine	< dl	< 0.1	[Bar chart showing result at 2.5th percentile]			

UREA CYCLE METABOLITES						
UREA CYCLE METABOLITES	RESULT <small>μmoles/100ml</small>	REFERENCE RANGE	PERCENTILE			
			2.5 th	16 th	50 th	84 th 97.5 th
Arginine	4.2	4.5- 13	[Bar chart showing result at 2.5th percentile]			
Aspartate	0.66	0.2- 2	[Bar chart showing result at 50th percentile]			
Citrulline	2.9	1.6- 6	[Bar chart showing result at 2.5th percentile]			
Ornithine	4.7	3- 15	[Bar chart showing result at 16th percentile]			
Urea	540	200- 830	[Bar chart showing result at 50th percentile]			
Glutamine	39	40- 70	[Bar chart showing result at 2.5th percentile]			
Asparagine	3.7	3.5- 7.5	[Bar chart showing result at 16th percentile]			

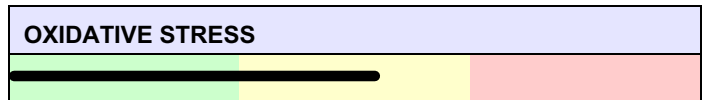
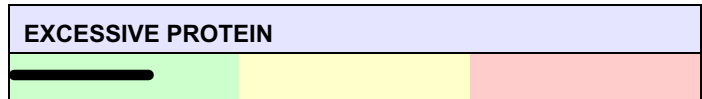
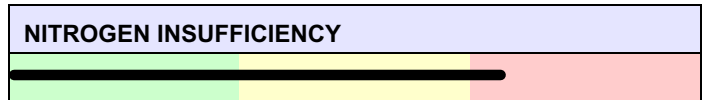
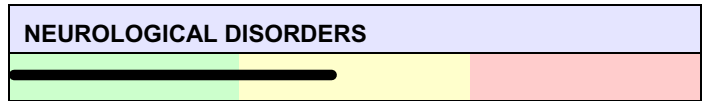
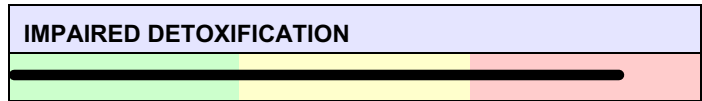
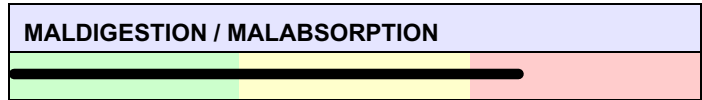
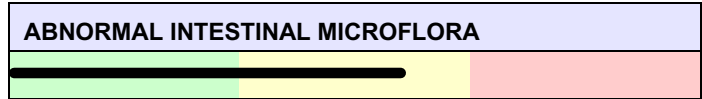
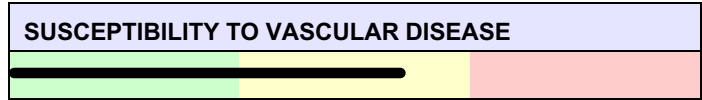
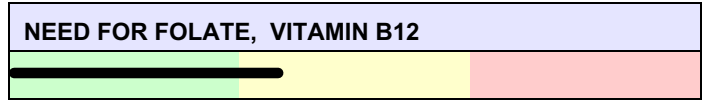
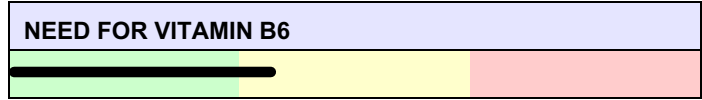
SPECIMEN DATA			
Comments:			
Date Collected:	Date Received: 11/22/2004	Date Completed: 11/22/2004	Methodology: HPLC
			V07.02



SUPPLEMENTATION SCHEDULE	PRESUMPTIVE NEEDS / IMPLIED CONDITIONS
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L-configured Amino Acids	Total Daily Oral Dose
Tryptophan	310 mg
Arginine	880 mg
Histidine	575 mg
Isoleucine	895 mg
Leucine	1230 mg
Lysine	1060 mg
Methionine	830 mg
Phenylalanine	1020 mg
Threonine	850 mg
Valine	1105 mg
Pyridoxal-5-phosphate	30 mg
Alpha-ketoglutarate	650 mg
Taurine	340 mg

Directions: Amino acids are best taken between meals unless instructed differently by your physician. Twice daily, dissolve one and ½ teaspoons (5grams) into a small amount of warm water, add water or juice, stir and drink immediately. For children under 12 years of age, consume one teaspoon 1-2 times per day; the amino acid formula can be added to applesauce but should not be mixed with other beverages or foods that contain protein (e.g. milk, yogurt). If you experience heightened energy that interferes with sleep, take the second daily dose earlier in the day. Patients typically take the amino acid supplement daily for up to 3 months before repeating the Plasma Amino Acid Test to re-evaluate the need for supplementation. The levels of one or both dietary peptides anserine and/or carnosine are markedly elevated in this plasma specimen, indicating incomplete digestion of anserine-containing meats (chicken, turkey, duck, rabbit, tuna and salmon) and/or carnosine-containing meats (beef, pork, tuna and salmon). Zinc status should be checked (RBC Elements) since the peptidase activity is zinc dependent. The peptidase activity can also be inhibited by high levels of Beta-alanine, which can result from B-6 insufficiency, or abnormal intestinal flora.



This recommended Amino Acid Supplement Schedule was calculated based upon the difference between the test results for this specific patient and optimal plasma levels, and guidelines for human amino acid requirements as provided by the Food and Nutrition Board of the NRC. The schedule has been provided at the request of a licensed medical practitioner and the calculated levels of amino acids only apply to ORAL administration. The supplement schedule is not intended for use by pregnant females and is strictly contraindicated for individuals with suspected or known renal insufficiency or renal failure.

Only pure, L-form crystalline amino acids should be used and the custom formulation should be prepared by credible pharmacies or purveyors who specialize in amino acid formulations. Amino acids are best taken with meals unless food sensitivities exist; in which case the amino acids should be taken between meals. In order to get the full benefit of the amino acid supplementation, one needs to ensure adequate intake of CALORIES and the essential co-factors that permit proper metabolism of the amino acids (eg. B-6, B-12, folate, magnesium). Supplemental cystine or N-acetylcysteine should not be given to patients who have been diagnosed with intestinal candidiasis.

PAA INTRODUCTION

This analysis of amino acids and related metabolites was performed using High Pressure Liquid Chromatography. The test provides fundamental information about the adequacy of dietary protein, digestive disorders, dysbiosis, mood and sleep disorders, and vitamin and mineral deficiencies. The "Presumptive Needs/Implied Conditions" are considered to be possible or probable rather than definite for the individual. When the level of a specific amino acid or metabolite deviates significantly from the norm, an interpretive paragraph is presented which briefly discusses the possible causes, clinical implications and remedies for the metabolic aberrations. If no significant abnormalities are detected, interpretive paragraphs and amino acid supplementation schedules are not provided.

Ammonia (high)

The level of ammonia in this specimen is abnormally high, which is often indicative of post-collection, generalized decay of amino acids as a result of improper preservation or specimen handling. Other possible reasons for a high level of ammonia include hyperammonemia of metabolic origin, or bacterial infection of the gastrointestinal or urinary tracts. Check for other markers of dysbiosis (see GI markers section), or urinary tract infection (elevated B-aminoisobutyrate, hydroxyproline, ethanolamine, phosphoethanolamine). Ammonia that is generated in the normal metabolism of amino acids is transported to the liver for detoxification via the urea cycle. To assess the potential for impaired urea cycle function, check for elevated levels of ornithine, glutamine and asparagine and, low levels of arginine and/or citrulline. Elevated systemic levels of ammonia are toxic and possible symptoms include: protein intolerance, headaches (migraine), fatigue, irritability, diarrhea, and nausea. These may be episodic symptoms associated with high protein meals. Chronically elevated ammonia in the CNS can result in decreased cognitive function, confusion, slurred speech and blurred vision.

Methionine (low)

Methionine, an essential amino acid, is low in this plasma specimen. Methionine may be low due to imbalanced protein intake or gastrointestinal dysfunction, including hypochlorhydria. Methionine is a precursor of other important amino acids and metabolites. Cysteine and taurine are derived in part from methionine. Cysteine is the rate limiting amino acid in the endogenous production of glutathione, a predominant amino acid in metallothionein, and is required for the production of Coenzyme A that is involved in fatty acid metabolism and the Krebs cycle. Taurine is an important antioxidant, a component of bile, a neurotransmitter, and very importantly, an osmoregulator that facilitates the intracellular retention of magnesium and potassium. Methionine, as s-adenosylmethionine provides methyl groups for the synthesis of serine, creatine, epinephrine and other methylated metabolites. Methionine deficiency can result in fatty liver and decreased capacity for endogenous detoxification of sulfhydryl reactive metals and xenobiotics. Symptoms that may be associated with insufficient methionine include inflammation, headaches, fatigue, biliary insufficiency, occlusive arterial disease, myopia and skeletal disorders. Animal products, as well as almonds and cashews are good dietary sources of methionine. Supplementation with methionine should be accompanied by magnesium, B-6, folate and B-12.

Taurine (low)

Taurine, a conditionally essential amino acid, is low in this plasma specimen. Taurine is an important antioxidant, neurotransmitter (CNS), osmoregulator (intracellular magnesium, potassium and calcium) and a component of bile acids. Taurine accounts for about 50% of the free amino acids in cardiac tissue, therefore taurine deficiency can result in arrhythmias. Taurine is also a key scavenger of hypochlorite ions, thus a shortage of taurine after viral or bacterial infections, or exposure to xenobiotics (eg. chlorine, chlorite, alcohol, aldehydes) can result in excessive inflammation. Taurine insufficiency is commonly associated with magnesium deficiency, chemical sensitivity, non-epileptic seizures, bile insufficiency with or without dyslipoproteinemias, and deficiencies in essential fatty acids and fat soluble vitamins. In humans little taurine is derived from cysteine and most taurine is derived from the diet. Foods that are relatively high in taurine include red meat, organ meats, fish and shellfish. Taurine is often very low in people that consume meat sparingly and/or patients with excessive exposure to chemicals. Renal resorption of taurine is competitively inhibited, and blood taurine levels are low in the presence of elevated levels of beta-alanine. Elevated beta-alanine is commonly associated with dysbiosis and/or B-6 deficiency. It can be futile to simply supplement taurine (or magnesium) without correcting the root cause of renal wasting of taurine, therefore a Comprehensive Stool Analysis may be warranted.

Lysine (low)

Lysine, an essential amino acid, is low in this plasma specimen. Lysine is a component of structural proteins and enzymes in the body. Transamination of amino acids requires lysine as an "anchor" point for coenzyme pyridoxal phosphate. Some individuals who exhibit symptoms of B-6 deficiency may actually have a lysine deficiency that limits functional B-6 activity. Lysine is abundant in animal source proteins and legumes, but is often deficient in vegetarian diets that are based on corn, rice and cereal grains. Lysine may also be low due to gastrointestinal dysfunction or renal transport disorders such as cystinuria or lysinuric protein intolerance (LPI, confirmation

by elevated urinary lysine). Symptoms associated with LPI in adults include: protein intolerance with GI distress, muscle weakness, anemia and possible ocular dysfunction with lens opacity. Symptoms commonly associated with simple lysine deficiency include poor appetite, muscle weakness / poor muscle tone, weight loss, anemia, and poor dream recall.

Threonine (low)

Threonine, an essential amino acid, is low in this plasma specimen. Threonine is the precursor of serine and glycine, and is required in the formation of glycoproteins that are essential in immune function. Threonine is absorbed rather slowly and the level of threonine is often low due to rapid transit time, maldigestion or insufficient quality or quantity of dietary protein. Meats, poultry, fish, some nuts and peanuts, and cheeses are good sources of threonine.

Arginine (low)

Arginine is abnormally low in this plasma specimen. Arginine is abundant in protein foods such as eggs, nuts, seeds, and meats, and is considered to be a "semi essential" amino acid. Poor arginine status can be the result of insufficient protein intake or maldigestion / malabsorption. Arginine is involved in ammonia detoxification (urea cycle), creatine synthesis (muscle metabolism), leukocyte and natural killer cell functions, and the release of insulin and growth hormone. Arginine insufficiency may be associated with fatigue, muscle weakness, poor wound healing, decreased libido and chronic infection.

Alanine (low)

Alanine, a nonessential amino acid, is low in this plasma specimen. Alanine is an abundant amino acid that is typically low with poor dietary habits or protein malnutrition. Gross protein malnutrition is rarely the result of maldigestion but rather the result of insufficient dietary protein/calories. Alanine is a primary source of glucose (gluconeogenesis) with caloric insufficiency (eg. anorexia, bulimia). Check for low urinary levels of essential amino acids, ammonia, urea, creatinine, and hypoglycemia.

Glutamine (low)

Glutamine, a nonessential amino acid, is low in this plasma specimen. Glutamine is derived directly from dietary protein, and also formed endogenously by addition of ammonia to glutamate. In the CNS the formation of glutamine from glutamate provides a disposal mechanism that protects against excess accumulation of cytotoxic ammonia. Low glutamine can be a result of protein malnutrition or negative nitrogen balance, incomplete digestive proteolysis or other malabsorption syndromes, or chronic alcoholism. Glutamine can also be artifactually low as a result of sample decay in which glutamine is broken down to glutamate and ammonia due to improper, post-collection preservation and handling of the blood specimen.

Tyrosine (low)

Tyrosine, an important nonessential amino acid, is low in this plasma specimen. Tyrosine is derived from dietary protein and, endogenously from the essential amino acid phenylalanine. Tyrosine is not only a constituent amino acid of proteins and enzymes but, importantly it is the precursor in the synthesis of dopa, dopamine, norepinephrine and epinephrine (adrenaline). Tyrosine is also iodinated to form the thyroid hormones. Hence a chronic deficiency of tyrosine

can result in hypothyroidism, adrenal catecholamine deficiency and impaired neurotransmitter metabolism. Tyrosine deficiency can be associated with behavioral and learning disorders, depression, anxiety and inability to deal with stress and, symptoms commonly exhibited with hypothyroidism. Low plasma tyrosine can result from phenylalanine deficiency (essential amino acid), protein malnutrition or malabsorption/dysbiosis, or impaired conversion of phenylalanine to tyrosine (requires iron and niacin). Impaired conversion of phenylalanine to tyrosine can precipitate phenylketonurea. Whole food sources that are relatively high in tyrosine include meats, poultry, wheat germ, cottage and ricotta cheeses, soy protein, cashews and lentils. Most fruits, vegetables and cereals are low in tyrosine.

Proline (low)

Proline, a nonessential amino acid that is particularly important in the formation of structural connective tissue, is low in this plasma specimen. Except in young children, proline is extremely well conserved by the kidneys. Even then, mild prolinurea is usually not associated with low plasma proline.

Alpha-aminoadipate (high)

Alpha-aminoadipic acid (A-AAA), an intermediary metabolite of lysine and tryptophan, is high in this plasma specimen. A-AAA accumulates in plasma with B-6 deficiency, or with impaired activation of B-6 to P-5-P. Elevated plasma A-AAA can also be associated with overgrowth of yeast or bacterial infection in the GI tract. In the later case, a Comprehensive Stool Analysis could be utilized for specific identification of the dysbiotic flora.

Carnosine (high)

Carnosine, a dietary peptide, is high in this plasma specimen. Carnosine is an incompletely digested peptide that is derived primarily from beef and pork. Carnosine consists of histidine and beta-alanine. Breakdown of the peptide requires a zinc dependent peptidase, which can be inhibited by high levels of the "end product" beta-alanine. Beta-alanine can accumulate if deamination of beta-alanine to alpha-ketoglutarate is impaired due to B-6 insufficiency. Therefore carnosine can accumulate as a result of high intake of carnosine containing meats with insufficient zinc and/or B-6 availability. Beta-alanine can also be elevated as a product of gastrointestinal bacterial conversion of aspartate and/or breakdown of pyrimidines that are high in yeast. Thus beta-alanine can accumulate and inhibit hydrolysis of carnosine as a result of significant dysbiosis, or deficiencies of B-6 and/or zinc. Comprehensive Stool Analysis (yeast/bacteria), Red Blood Cell Elements Analysis (zinc, potassium, and magnesium) and assessment of B-6 status are useful to identify the cause and potential consequences of the inability to breakdown this dietary peptide.