DOCTOR'S DATA INC

# Amino Acids; Urine

| ESSENTIAL / CONDITIONALLY INDISPENSABLE AMINO ACIDS | RESULT µM/g creatinine | REFERENCE INTERVAL | PERCENTILE 2.5th 16th 50th 84th 97.5th |
|---|---|---|---|
| Methionine | **6.5** | 7 - 35 | |
| Lysine | **62** | 35 - 500 | |
| Threonine | **45** | 48 - 275 | |
| Leucine | **27** | 10 - 65 | |
| Isoleucine | **10** | 4 - 28 | |
| Valine | **34** | 12 - 50 | |
| Phenylalanine | **50** | 25 - 75 | |
| Tryptophan | **47** | 20 - 75 | |
| Taurine | **1960** | 170 - 1200 | |
| Cysteine | **30** | 20 - 57 | |
| Arginine | **36** | 8 - 50 | |
| Histidine | **470** | 270 - 1150 | |

| NONESSENTIAL AMINO ACIDS | RESULT µM/g creatinine | REFERENCE INTERVAL | PERCENTILE 2.5th 16th 50th 84th 97.5th |
|---|---|---|---|
| Alanine | **79** | 100 - 500 | |
| Aspartate | **6.2** | 6 - 30 | |
| Asparagine | **50** | 40 - 180 | |
| Glutamine | **240** | 145 - 580 | |
| Glutamate | **25** | 8 - 45 | |
| Cystine | **36** | 20 - 90 | |
| Glycine | **430** | 280 - 2800 | |
| Tyrosine | **90** | 23 - 113 | |
| Serine | **170** | 110 - 450 | |
| Proline | **6.6** | 1 - 45 | |



## SPECIMEN DATA

Collection Period:
Volume:

Methodology: **LC MS/MS**
**$NH_4$, Urea, Creatinine by Automated Chem Analyzer**

v3

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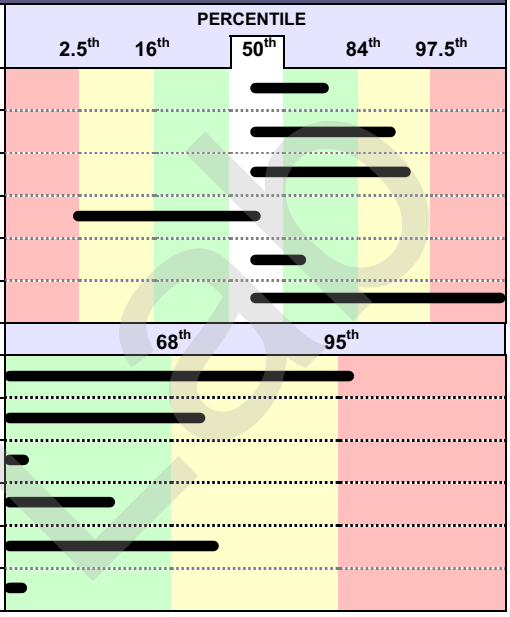
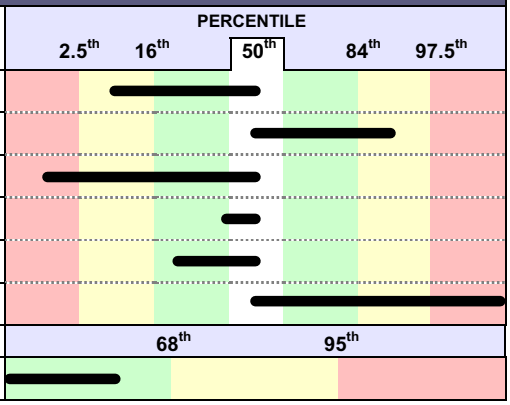
## GASTROINTESTINAL MARKERS

| | RESULT µM/g creatinine | REFERENCE INTERVAL |
|---|---|---|
| Ammonia ($NH_4$) | **25700** | 9000 - 39000 |
| Ethanolamine | **301** | 120 - 330 |
| Alpha-Aminoadipitate | **47** | 7 - 50 |
| Threonine | **45** | 48 - 275 |
| Tryptophan | **47** | 20 - 75 |
| Taurine | **1960** | 170 - 1200 |
| Beta-alanine | **23** | < 20 |
| Beta-aminoisobutyrate | **120** | < 300 |
| Anserine | **1.7** | < 60 |
| Carnosine | **7.7** | < 35 |
| Gamma-aminobutyrate | **3.2** | < 5 |
| Hydroxyproline | **1.6** | < 32 |



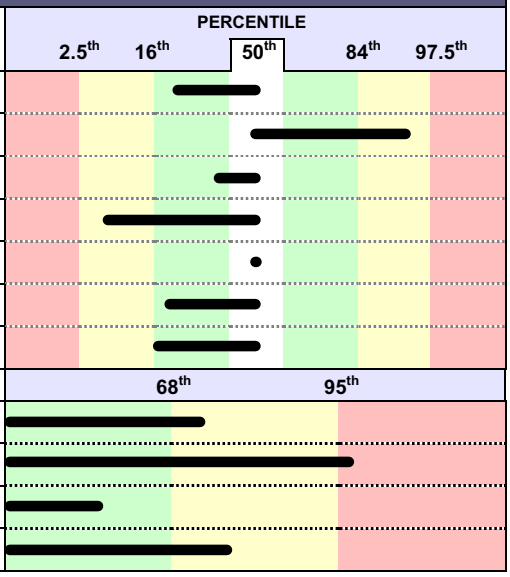

## MAGNESIUM DEPENDANT MARKERS

| | RESULT µM/g creatinine | REFERENCE INTERVAL |
|---|---|---|
| Citrulline | **2.7** | 1 - 24 |
| Ethanolamine | **300** | 120 - 330 |
| Phosphoethanolamine | **7.7** | 15 - 56 |
| Phosphoserine | **0.17** | 0.06 - 0.6 |
| Serine | **170** | 110 - 450 |
| Taurine | **1960** | 170 - 1200 |
| Methionine Sulfoxide | **3.4** | < 10 |




## B6, B12, & FOLATE DEPENDANT MARKERS

| | RESULT µM/g creatinine | REFERENCE INTERVAL |
|---|---|---|
| Serine | **170** | 110 - 450 |
| Alpha-aminoadipate | **47** | 7 - 50 |
| Cysteine | **30** | 20 - 57 |
| Cystathionine | **8** | 7 - 40 |
| 1-Methylhistidine | **160** | 75 - 240 |
| 3-Methylhistidine | **130** | 50 - 900 |
| Alpha-amino-N-butyrate | **15** | 7 - 50 |
| Beta-aminoisobutyrate | **120** | < 300 |
| Beta-alanine | **23** | < 20 |
| Homocystine | **0.29** | < 1 |
| Sarcosine | **3.8** | < 7 |



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## DETOXIFICATION MARKERS

| | RESULT µM/g creatinine | REFERENCE INTERVAL | PERCENTILE 2.5th 16th 50th 84th 97.5th |
|---|---|---|---|
| Methionine | **6.4** | 7 - 35 | |
| Cysteine | **30** | 20 - 57 | |
| Taurine | **1960** | 170 - 1200 | |
| Glutamine | **240** | 145 - 580 | |
| Glycine | **430** | 280 - 2800 | |
| Aspartate | **6.2** | 6 - 30 | |

## NEUROLOGICAL MARKERS

| | RESULT µM/g creatinine | REFERENCE INTERVAL | PERCENTILE 2.5th 16th 50th 84th 97.5th |
|---|---|---|---|
| Ammonia ($NH_4$) | **25700** | 9000 - 39000 | |
| Glutamine | **240** | 145 - 580 | |
| Phenylalanine | **50** | 25 - 75 | |
| Tyrosine | **90** | 23 - 113 | |
| Tryptophan | **47** | 20 - 75 | |
| Taurine | **1960** | 170 - 1200 | |
| Cystathionine | **8** | 7 - 40 | |
| | | | 68th 95th |
| Beta-alanine | **23** | < 20 | |

## UREA CYCLE METABOLITES

| | RESULT per creatinine | REFERENCE INTERVAL | PERCENTILE 2.5th 16th 50th 84th 97.5th |
|---|---|---|---|
| Arginine | **36 µM/g** | 8 - 50 | |
| Aspartate | **6.2 µM/g** | 6 - 30 | |
| Citrulline | **2.7 µM/g** | 1 - 24 | |
| Ornithine | **13 µM/g** | 3 - 35 | |
| Urea | **260 mM/g** | 150 - 480 | |
| Ammonia ($NH_4$) | **25700 µM/g** | 9000 - 39000 | |
| Glutamine | **240 µM/g** | 145 - 580 | |
| Asparagine | **50 µM/g** | 40 - 180 | |

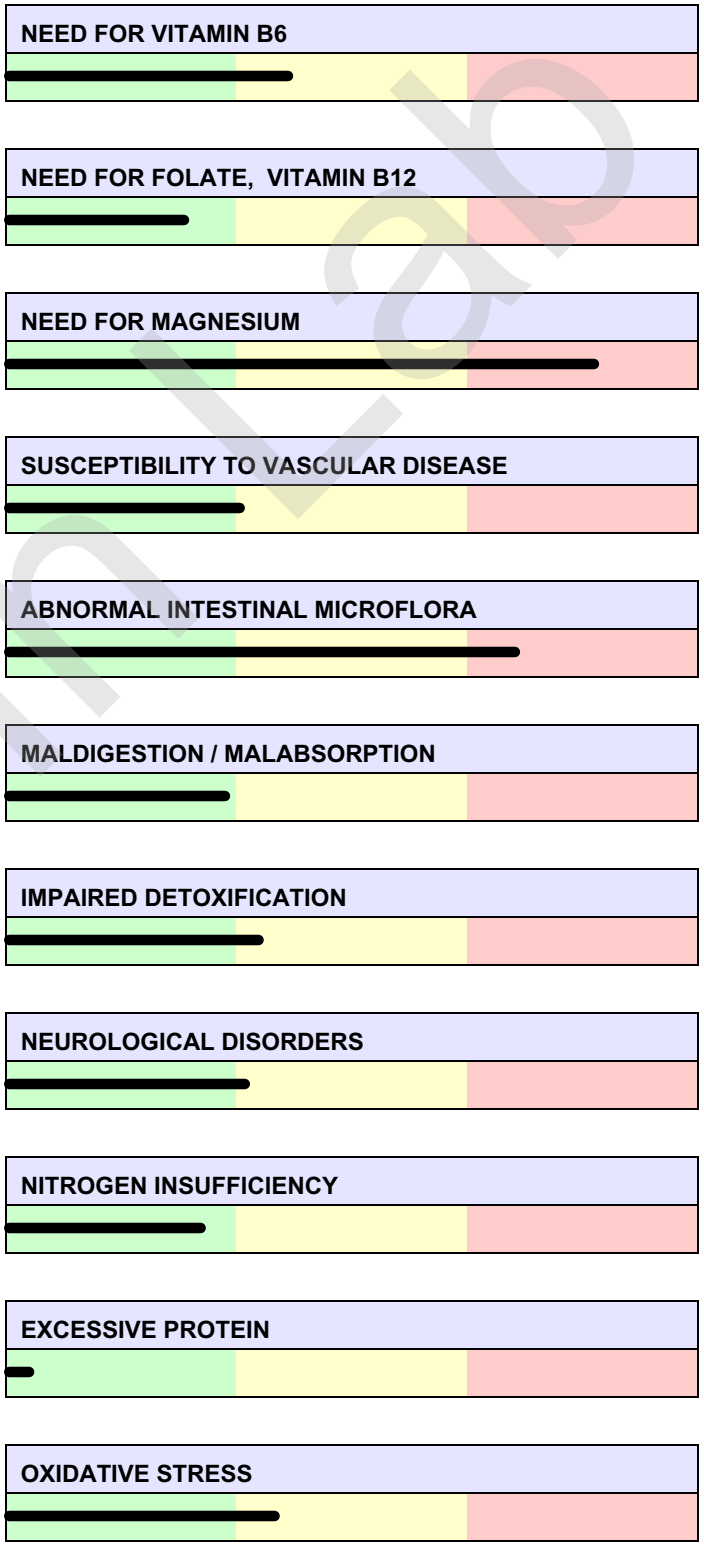
## OTHER

| | RESULT | REFERENCE INTERVAL | PERCENTILE 2.5th 16th 50th 84th 97.5th |
|---|---|---|---|
| Creatinine | **160 mg/dL** | 35 - 240 | |

## SUPPLEMENTATION SCHEDULE

A patient-specific Amino Acid Supplement Schedule cannot be calculated because the patient's body weight was not provided on the requisition form. Body weight is an essential variable in this calculation. To receive a suggested supplement schedule for this patient, please contact Doctor's Data Customer Service Department at 1-800-323-2784 or 1-630-377-8139 and provide the patient's body weight. An amino acid supplement schedule will then be calculated and a new report will be issued.

## PRESUMPTIVE NEEDS / IMPLIED CONDITIONS



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. 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.

”Presumptive Needs” are not the result of direct analyses of B vitamins or magnesium but are based upon algorithms that utilize levels of specific amino acids (AA) and intermediary metabolites that may be abnormal if nutrient cofactors limit normal AA metabolism. Direct testing for B vitamins and magnesium (Red Blood Cell Elements) may be warranted. ”Implied conditions” may infer further clinical evaluation, functional testing and direct laboratory testing (e.g. Comprehensive Stool Analysis, Cardiovascular Risk Profile, DNA Oxidative Damage, Methylation Profile).

## Creatinine

The urinary creatinine concentration (CC) presented in this report represents the actual creatinine concentration in the specimen that was submitted. Under normal conditions, the rate of excretion of creatinine is quite constant and highly correlated with lean body mass (muscle). However, the CC can vary significantly as a function of urine volume. An unusually high CC most likely indicates poor hydration of the patient at the time of the urine collection. A very low CC most likely indicates unusually high fluid consumption, or perhaps the influence of diuretics. If the urine specimen is very dilute (extremely low CC), the accuracy of the amino acid analysis may be compromised due to analytical detection limits. It is emphasized that the CC in this specimen should not be utilized to assess renal function or glomerular filtration. For that purpose, one should perform a bona fide creatinine clearance test.

For a given age and gender, intra-individual variability in daily creatinine excretion can vary by as much as two-fold. Therefore, to more accurately assess amino acid status using a random collection, the reported values for each analyte are expressed per gram ”normalized” creatinine. Creatinine values are adjusted to account for body surface area (BSA) using the formula:

CreatinineN (Normalized) = creatinine concentration x (1.73/BSA).

## Methionine (low)

Methionine, an essential amino acid, is low in this urine specimen. 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 also serves as a methyl donor (serine, creatine, epinephrine). 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 a good dietary sources of methionine. Supplementation with methionine should be accompanied with magnesium, B-6, folate and B-12.

Threonine (low)

Threonine, an essential amino acid, is low in this urine 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 slowly absorbed and is often low as a result of 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.

Taurine (high)

Taurine, a conditionally essential amino acid, is abnormally high in this urine specimen. Elevated urinary taurine is usually associated with impaired renal conservation (wasting) due to competition by elevated levels of B-alanine (check B-alanine). Excessive levels of B-alanine are commonly associated with dysbyosis (bacterial and/or fungal). However, first rule out oral supplementation of taurine. B-alanine could also accumulate and compete for retention of taurine with a frank B-6 deficiency; in such a case one would also expect to see elevations in other amino acids that require transamination (eg. leucine, isoleucine, valine). Urinary wasting of taurine can be associated with low intracellular taurine that can negatively impact on intracellular electrolytes (magnesium, potassium, calcium, sodium). Taurine accounts for about 50% of the free amino acids in cardiac tissue, therefore taurine deficiency can result in arrhythmias. Taurine is also an important antioxidant, neurotransmitter (CNS), and a component of bile acids (fat and fat soluble vitamin absorption). Taurine is 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 or chemical sensitivity. It can be futile to simply supplement taurine (or magnesium) without correcting the cause of renal wasting of taurine, therefore a Comprehensive Stool Analysis test may be warranted.

Alanine (low)

Alanine, a nonessential amino acid, is low in this urine 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 and creatinine and hypoglycemia.

Beta-alanine (high)

Beta-alanine, a nonessential intermediary amino acid, is abnormally elevated in this urine specimen. Normally beta-alanine is near completely deaminated to alpha-ketoglutarate

(B-6 dependent). Beta-alanine is derived from: (1) the breakdown of DNA/RNA (yeast, pyrimidine, uracil), (2) activity of unusual bacteria on aspartic acid and, (3) the hydrolysis of anserine and carnosine, which are peptides found in beef, pork, poultry, salmon, and tuna. Elevated beta-alanine inhibits the breakdown of anserine and carnosine, and impairs the renal conservation of taurine and beta-aminoisobutyric acid; taurine is an important antioxidant, neurotransmitter and essential for the retention and homeostasis of intracellular magnesium and potassium. Beta-alanine is a neurotoxic substance that suppresses development in the brain and spinal cord. Beta-alanine also interferes with the metabolism of the neuroinhibitory neurotransmitter gamma-aminobutyric acid. Hyper-B- alaninurea has been associated with seizures and somnolence.Patients exhibiting elevated urinary B-alanine should be retested after given a trial on a low-protein, low-pyrimidine diet and high B-6 (P-5-P). Elevated levels of B-alanine are highly correlated with gastrointestinal and genitourinary infections in patients with Chronic Fatigue Syndrome. Intestinal dysbiosis, especially candidiasis, should be evaluated via a Comprehensive Stool Analysis.

Phosphoethanolamine (low)

Phophoethanolamine, a nonessential phosphorous bearing amino acid, is low in this urine specimen. Phosphoethanolamine is derived from dietary sources and is also formed endogenously from serine via phosphorylation of ethanolamine. When ethanolamine is high or normal and phosphoethanolamine is low there is a presumptive need for magnesium (magnesium dependent kinase). Phosphoethanolamine is a precursor of phosphotidyl choline, choline and the neurotransmitter acetylcholine. If low phosphoethanolamine results in low acetylcholine, and there is insufficient choline from dietary lecithin, there may be depressed activity of the parasympathetic nervous system (eg. decreased peristalsis, ability to sweat), and poor memory and cognitive function. Low phosphoethanolamine is usually the result of magnesium deficiency or protein malnutrition.