MOSAIC DIAGNOSTICS
Formerly Great Plains Laboratory

LAB #: Sample Report
PATIENT: Sample Patient
SEX: Female
DOB: **AGE: 69**
CLIENT#: 12345

Amino Acids; Urine

ESSENTIAL / CONDITIONALLY INDISPENSABLE AMINO ACIDS	RESULT µmol/g creatinine	REFERENCE INTERVAL	PERCENTILE 2.5th 16th 50th 84th 97.5th
Methionine	**5.5**	8 - 48	
Lysine	**50**	40 - 530	
Threonine	**73**	56 - 320	
Leucine	**27**	8 - 80	
Isoleucine	**13**	5 - 30	
Valine	**40**	15 - 70	
Phenylalanine	**21**	25 - 100	
Tryptophan	**16**	20 - 100	
Taurine	**6890**	220 - 1300	
Cysteine	**55**	25 - 73	
Arginine	**26**	8 - 55	
Histidine	**89**	350 - 1700	

NONESSENTIAL AMINO ACIDS	RESULT µmol/g creatinine	REFERENCE INTERVAL	PERCENTILE 2.5th 16th 50th 84th 97.5th
Alanine	**98**	130 - 600	
Aspartate	**6.7**	6 - 33	
Asparagine	**32**	35 - 200	
Glutamine	**180**	155 - 650	
Glutamate	**12**	10 - 52	
Cystine	**47**	30 - 105	
Glycine	**980**	350 - 3500	
Tyrosine	**39**	28 - 120	
Serine	**260**	125 - 560	
Proline	**8.8**	1 - 55	

SPECIMEN DATA

Comments:

Date Collected: 06/05/2024
Date Received: 06/08/2024
Date Reported: 06/11/2024

Collection Period: **Random**
Volume:

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

v3

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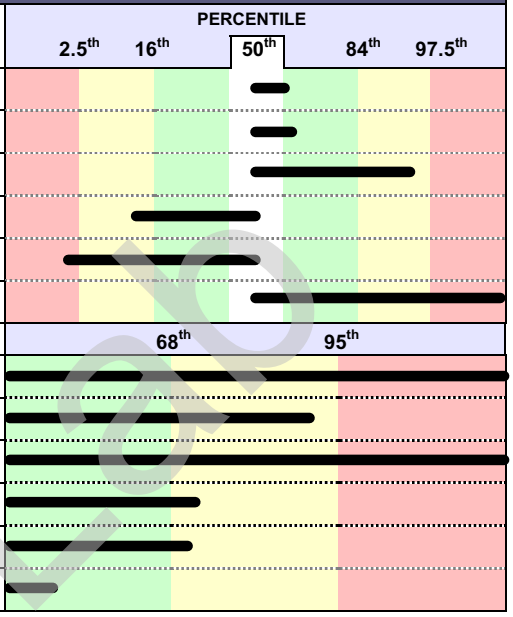
DATE COLLECTED: 06/05/2024
PAGE: 2

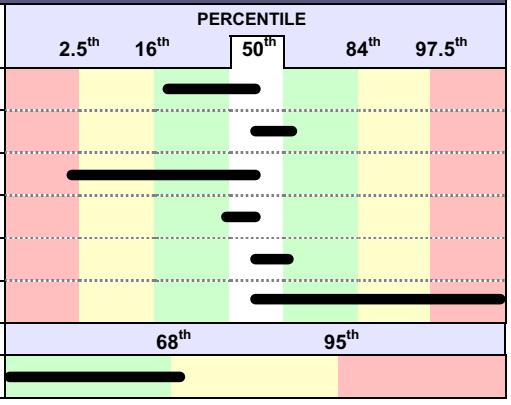
GASTROINTESTINAL MARKERS

	RESULT µmol/g creatinine	REFERENCE INTERVAL
Ammonia (NH_4)	25200	12000 - 49000
Ethanolamine	300	120 - 440
Alpha-Aminoadipitate	66	6 - 72
Threonine	73	56 - 320
Tryptophan	16	20 - 100
Taurine	6890	220 - 1300
Beta-alanine	250	< 20
Beta-aminoisobutyrate	340	< 380
Anserine	230	< 95
Carnosine	21	< 50
Gamma-aminobutyrate	3.5	< 7
Hydroxyproline	6.9	< 45



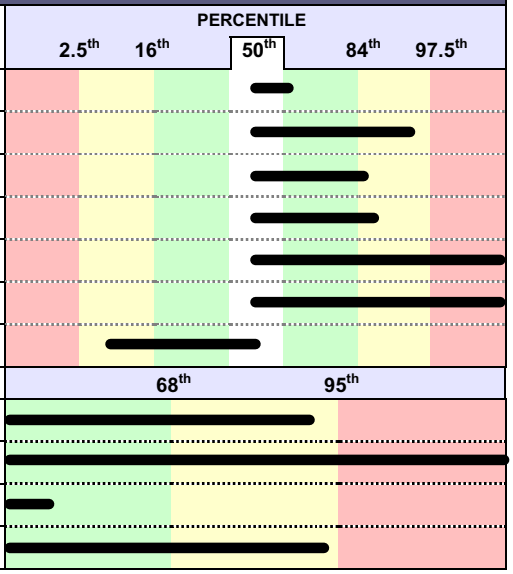
MAGNESIUM DEPENDANT MARKERS

	RESULT µmol/g creatinine	REFERENCE INTERVAL
Citrulline	3.4	1 - 30
Ethanolamine	300	120 - 440
Phosphoethanolamine	17	20 - 75
Phosphoserine	0.17	0.05 - 0.8
Serine	260	125 - 560
Taurine	6890	220 - 1300
Methionine Sulfoxide	5.4	< 10



B6, B12, & FOLATE DEPENDANT MARKERS

	RESULT µmol/g creatinine	REFERENCE INTERVAL
Serine	260	125 - 560
Alpha-aminoadipate	66	6 - 72
Cysteine	55	25 - 73
Cystathionine	32	8 - 50
1-Methylhistidine	410	70 - 280
3-Methylhistidine	2610	55 - 1100
Alpha-amino-N-butyrate	8.7	5 - 72
Beta-aminoisobutyrate	340	< 380
Beta-alanine	250	< 20
Homocystine	0.14	< 1
Sarcosine	9.5	< 10



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DATE COLLECTED: 06/05/2024
PAGE: 3

DETOXIFICATION MARKERS

	RESULT µmol/g creatinine	REFERENCE INTERVAL	PERCENTILE 2.5th 16th 50th 84th 97.5th
Methionine	5.5	8 - 48	
Cysteine	55	25 - 73	
Taurine	6890	220 - 1300	
Glutamine	180	155 - 650	
Glycine	980	350 - 3500	
Aspartate	6.7	6 - 33	

NEUROLOGICAL MARKERS

	RESULT µmol/g creatinine	REFERENCE INTERVAL	PERCENTILE 2.5th 16th 50th 84th 97.5th
Ammonia (NH_4)	25200	12000 - 49000	
Glutamine	180	155 - 650	
Phenylalanine	21	25 - 100	
Tyrosine	39	28 - 120	
Tryptophan	16	20 - 100	
Taurine	6890	220 - 1300	
Cystathionine	32	8 - 50	
			68th 95th
Beta-alanine	250	< 20	

UREA CYCLE METABOLITES

	RESULT per creatinine	REFERENCE INTERVAL	PERCENTILE 2.5th 16th 50th 84th 97.5th
Arginine	26 µmol/g	8 - 55	
Aspartate	6.7 µmol/g	6 - 33	
Citrulline	3.4 µmol/g	1 - 30	
Ornithine	21 µmol/g	3 - 45	
Urea	700 mmol/g	150 - 590	
Ammonia (NH_4)	25200 µmol/g	12000 - 49000	
Glutamine	180 µmol/g	155 - 650	
Asparagine	32 µmol/g	35 - 200	

OTHER

	RESULT	REFERENCE INTERVAL	PERCENTILE 2.5th 16th 50th 84th 97.5th
Creatinine	43 mg/dL	30 - 225	

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

- NEED FOR VITAMIN B6
- NEED FOR FOLATE, VITAMIN B12
- NEED FOR MAGNESIUM
- SUSCEPTIBILITY TO VASCULAR DISEASE
- ABNORMAL INTESTINAL MICROFLORA
- MALDIGESTION / MALABSORPTION
- IMPAIRED DETOXIFICATION
- NEUROLOGICAL DISORDERS
- NITROGEN INSUFFICIENCY
- EXCESSIVE PROTEIN
- OXIDATIVE STRESS

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.

Phenylalanine (low)

Phenylalanine, an essential amino acid, is low in this urine specimen. Phenylalanine is required for the synthesis of proteins and is the precursor of tyrosine. Tyrosine is required for the production of neurotransmitters (eg.dopamine, DOPA, epinephrine) and, thyroid hormone. Phenylalanine is typically low as a result of unbalanced protein in the diet or gastrointestinal dysfunction, particularly hypochlorhydria. Phenylalanine is often low in patients with endogenous depression. Soy protein, legumes/lentils, cheese, nuts and shellfish are good dietary sources of phenylalanine.

Tryptophan (low)

Tryptophan, an essential amino acid, is low in this urine specimen. Tryptophan is the precursor of niacin and serotonin (vasoconstrictor and neurotransmitter). Low serotonin is often associated with disturbed sleep cycle or insomnia, anxiety or depression, aggressive behavior and low pain threshold. Tryptophan can be low as a result of low quality/quantity protein intake or intestinal malabsorption (eg. hypochlorhydria). Bacterial action on unabsorbed tryptophan in the intestine produces elevated levels of mildly toxic indole compounds such as indican ("blue diaper syndrome" in infants). A Comprehensive Stool Analysis may be warranted if dietary intake of protein appears to be adequate. Foods that are good sources of tryptophan include turkey, wild game, pork, soy protein, sunflower seeds, and cheeses.

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.

Histidine (low)

Histidine, a semi essential amino acid, is low in this urine specimen. Histidine is required for maintenance and growth of tissue, transport of copper, and it is the precursor of histamine (vasodilator). Histamine stimulates gastric secretions (HCL) and is necessary for proper digestion of food and assimilation of nutrients. Histidine is commonly low in patients with rheumatoid arthritis. Low histidine may result from protein malnutrition or gastrointestinal dysfunction.

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.

Asparginine (low)

Asparginine, a nonessential amino acid, is low in this urine specimen. Asparginine is derived from dietary protein, and via synthesis from aspartate and glutamine can minimize accumulation of ammonia in tissues. Asparginine is also required for optimal immune function. Insufficient intake of protein is the most common reason for low urinary asparginine. Check for low levels of essential amino acids and ammonia.

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.

Anserine (high)

Anserine, a dietary peptide is high in this urine specimen. Anserine is an incompletely digested peptide that is derived primarily from poultry, duck, rabbit, tuna and salmon. Anserine consists of 1-methylhistidine 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 anserine can accumulate as a result of high intake of anserine containing protein 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 anserine as a result of significant dysbiosis, or deficiencies of B-6 and/or zinc. Beta-alanine can have adverse effects in the central nervous system but, more commonly elevated levels of beta-alanine inhibit renal conservation of the amino acid taurine which is an important antioxidant, neurotransmitter and, essential for the retention and metabolism of intracellular magnesium and potassium. If urinary taurine is either low or high, magnesium deficiency is likely or pending. 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.

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.

1-Methylhistidine (high)

1-methylhistine is abnormally high in this urine specimen. 1-methyhistidine is abundant in poultry tuna and salmon and can be elevated if intake of these foods is excessive. A reduction in the intake of such dietary protein sources may be warranted, and supplemental B-12 and folic acid may be beneficial.

3-Methylhistidine (high)

3-methylhistidine is high in this urine specimen. 3-methylhistidine is derived primarily from skeletal muscle, and to a lesser extent from skin. Elevated 3-methylhistidine may be indicative of an abnormal rate of catabolism of muscle protein in the body or an

abnormal rate of turnover of muscle tissue. This may be a degenerative condition, or simply the result of very strenuous, prolonged exercise/athletic training. 3-methylhistidine may also be higher than normal if the diet or assimilation of folic acid and B-12 are insufficient.

Urea (high)

The level of urea in this urine specimen is higher than normal. Elevated urinary urea would be expected with excessive protein intake; this would be associated with high urinary levels of several amino acids and high blood urea nitrogen. Alternatively, urinary urea might be high in association with abnormal renal clearance (nephritis or toxicity); this might be associated with elevated urine creatinine, and low blood urea nitrogen.