Results:

Tests	*Results*	*H/L*	*Reference ranges*	
Urine Amino Acid profiling				
1-methylhistidine (u)	25		3 - 151	mmol/mol creat
3-methylhistidine (u)	142	H	19 - 47	mmol/mol creat
4-hydroxyproline (u)	2		< 13	mmol/mol creat
Alpha-aminoadipic acid (u)	4		< 5	mmol/mol creat
Alpha-aminobutyric acid (u)	1		< 4	mmol/mol creat
Alanine (u)	23		16 - 68	mmol/mol creat
Anserine (u)	21	H	< 4	mmol/mol creat
Arginine (u)	3		< 5	mmol/mol creat
Argininosuccinic acid (u)	3	H	< 2	mmol/mol creat
Asparagine (u)	8		< 23	mmol/mol creat
Beta-alanine (u)	2		< 15	mmol/mol creat
Beta-aminoisobutyric acid (u)	11		< 91	mmol/mol creat
Carnosine (u)	6	H	< 4	mmol/mol creat
Citrulline (u)	3		< 4	mmol/mol creat
Cystathionine (u)	3		< 15	mmol/mol creat
Cystine (u)	5		3 - 17	mmol/mol creat
Ethanolamine (u)	32	L	44 - 53	mmol/mol creat
Glutamine (u)	13	L	20 - 76	mmol/mol creat
Glycine (u)	77		43 - 173	mmol/mol creat
Histidine (u)	42		26 - 153	mmol/mol creat
Homocitrulline (u)	4	H	< 3	mmol/mol creat
Homocystine (u)	1	H	< 1	mmol/mol creat
Isoleucine (u)	3		< 4	mmol/mol creat
Leucine (u)	5		2 - 11	mmol/mol creat
Lysine (u)	12		7 - 58	mmol/mol creat
Methionine (u)	2	H	< 2	mmol/mol creat
Ornithine (u)	3		< 5	mmol/mol creat
Phenylalanine (u)	5		2 - 19	mmol/mol creat
Phosphoserine (u)	2	H	< 1	mmol/mol creat
Phosphoethanolamine (u)	4		< 5	mmol/mol creat
Pipecolic acid (u)	1		< 6	mmol/mol creat
Proline (u)	2		< 9	mmol/mol creat
Sarcosine (u)	<1		< 1	mmol/mol creat
Serine (u)	31		21 - 50	mmol/mol creat
Taurine (u)	28		3 - 173	mmol/mol creat
Threonine (u)	13		7 - 29	mmol/mol creat
Tryptophan (u)	6		2 - 13	mmol/mol creat
Tyrosine (u)	9		2 - 23	mmol/mol creat
Valine (u)	4		3 - 13	mmol/mol creat
Phenylalanine/Tyrosine ratio (u)	0.6		< 2.0	
Pre-Analytical Screening				
U-Creatinine	12.91			mmol/L
U-Uric Acid	3.75			mmol/L
Specific Gravity (U-Labstix)	1.02			
pH (U-Labstix)	5			
Leucocytes (U-Labstix)	Negative			
Nitrites(U-Labstix)	Negative			
Haemoglobin (U-Labstix)	Negative			
Blood (U-Labstix)	Negative			
Protein (U-Labstix)	Negative			
Glucose (U-Labstix)	Negative			
Ascorbic Acid (U-Labstix)	Negative			
Ketones (U-Labstix)	Negative			
Urobilinogen (U-Labstix)	Negative			
Bilirubin (U-Labstix)	Negative			

Skylims 2023/07/13 09:59

Tests	Results	H/L	Reference ranges	
Urine organic acids: Glycolysis and Kreb Cycle intermediates				
2-Oxoglutaric acid/2-Ketoglutaric acid	0.35		< 74.00	mmol/mol creat
Aconitic acid	**26.79**	**H**	5.20 - 16.30	mmol/mol creat
Citric acid	147.11		87.00 - 639.00	mmol/mol creat
D/L-2-Hydroxyglutaric acid	1.91		< 52.00	mmol/mol creat
DL-Lactic acid	1.65		< 16.40	mmol/mol creat
Fumaric acid	**0.1**	**L**	0.20 - 1.70	mmol/mol creat
Isocitric acid	3.18		< 119.10	mmol/mol creat
Malic acid	0.57		< 5.30	mmol/mol creat
Pyruvic acid	0.12		< 3.70	mmol/mol creat
Succinic acid	4.82		2.50 - 13.50	mmol/mol creat
Urine organic acids: Fatty acid oxidation intermediates				
3-Hydroxybutyric acid	BDL		< 6.40	mmol/mol creat
Acetoacetic acid	0.34		< 24.90	mmol/mol creat
Adipic acid	0.88		< 5.00	mmol/mol creat
Ethylmalonic acid	0.77		< 4.00	mmol/mol creat
Methylsuccinic acid	BDL		< 6.20	mmol/mol creat
Sebacic acid	0.34		< 5.00	mmol/mol creat
Suberic acid	1.04		< 1.90	mmol/mol creat
Urine organic acids: Branched chain amino acid intermediates				
2-Ethylhydracrylic-/2-Ethyl-3-OH-propionic acid	1.71		< 2.90	mmol/mol creat
2-Hydroxyisocaproic acid	0.32		< 0.39	mmol/mol creat
2-Hydroxyisovaleric acid	BDL		< 0.48	mmol/mol creat
2-Oxoisovaleric acid / 3-Methyl-2-oxobutyric acid	0.13		< 1.10	mmol/mol creat
3-Hydroxy-2-methylbutyric acid	2.51		< 6.20	mmol/mol creat
3-Hydroxyisobutyric acid	**6.95**	**L**	11.80 - 59.80	mmol/mol creat
3-Hydroxyisovaleric acid	2.64		< 17.20	mmol/mol creat
3-Methyl-2-oxovaleric-/2-Keto-3-methylvaleric acid	0.44		< 4.80	mmol/mol creat
3-Methylglutaconic acid	2.72		2.30 - 8.30	mmol/mol creat
3-Methylglutaric acid	**0.48**	**L**	1.00 - 6.50	mmol/mol creat
2-Ketoisocaproic acid/4-Methyl-2-oxovaleric acid	0.5		< 0.86	mmol/mol creat
Malonic acid	0.06		< 3.10	mmol/mol creat
Urine organic acids: Phenylalanine and Tyrosine intermedietes				
Phenylpyruvic acid	BDL		< 0.76	mmol/mol creat
3-Phenyllactic acid	BDL		< 0.49	mmol/mol creat
4-Hydroxyphenyllactic acid	0.69		< 3.00	mmol/mol creat
4-Hydroxyphenylpyruvic acid	BDL		< 4.30	mmol/mol creat
Mandelic acid	0.03		< 1.70	mmol/mol creat
Homogentisic acid	BDL		< 2.80	mmol/mol creat
Succinylacetone	BDL		< 4.70	mmol/mol creat
Urine organic acids: Other Amino acid intermediates				
3-Hydroxyglutaric acid (Lysine Metabolism)	0.91		< 3.00	mmol/mol creat
Glutaconic acid (Lysine Metabolism)	0.93		< 3.10	mmol/mol creat
N-Acetylaspartic acid (Aspartic Metabolism)	0.63		< 7.00	mmol/mol creat
Urine organic acids: Pyrimidine and Urea cycle intermediates				
Orotic acid	0.29		< 1.20	mmol/mol creat
Thymine	BDL		< 0.90	mmol/mol creat
Uracil	0.28		< 22.80	mmol/mol creat
Uric acid	290.47		93.00 - 329.00	mmol/mol creat
Urine organic acids: Detoxification markers				
2-Hydroxybutyric acid	BDL		< 6.90	mmol/mol creat
2-Methylhippuric acid	BDL		< 13.50	mmol/mol creat
Glyceric acid	0.3		< 28.80	mmol/mol creat
Glycolic acid	24.76		< 78.10	mmol/mol creat
N-2-Methylbutyrylglycine	BDL		< 2.00	mmol/mol creat
N-Butyrylglycine	BDL		< 2.00	mmol/mol creat
N-Hexanoylglycine	BDL		< 2.00	mmol/mol creat
N-Isobutyrylglycine	0.17		< 3.80	mmol/mol creat

Skylims 2023/07/13 09:59

Tests	Results	H/L	Reference ranges	
Urine organic acids: Detoxification markers				
N-Isovalerylglycine	0.04		< 10.00	mmol/mol creat
N-Phenylpropionylglycine	BDL		< 0.60	mmol/mol creat
N-Suberylglycine	BDL		< 0.52	mmol/mol creat
N-Tiglylglycine	1.07		< 2.00	mmol/mol creat
N-3-Methylcrotonylglycine	0.09		< 2.00	mmol/mol creat
Oxalic acid	16.09		1.11 - 33.34	mmol/mol creat
Pyroglutamic acid	5.45		< 24.90	mmol/mol creat
Urine organic acids: Microbiome markers				
2,5-Furandicarboxylic acid	1.22		< 5.40	mmol/mol creat
2-Hydroxyphenylacetic acid	**0.75**	**L**	1.40 - 3.70	mmol/mol creat
3,4-Dihydroxyphenylpropionic acid	**1.63**	**H**	< 0.35	mmol/mol creat
3,5-Dihydroxyphenylpropionic acid (DHPPA)	BDL		< 0.38	mmol/mol creat
3-Hydroxyphenyl-3-hydroxypropionic acid (HPHPA)	BDL		< 90.00	mmol/mol creat
3-Indoleacetic acid	2.19		< 5.40	mmol/mol creat
3-Oxoglutaric acid/3-Ketoglutaric acid	BDL		< 0.11	mmol/mol creat
4-Hydroxybenzoic acid	2.27		< 3.60	mmol/mol creat
4-Hydroxyhippuric acid	**57.08**	**H**	< 30.00	mmol/mol creat
4-Hydroxyphenylacetic acid	9.69		1.40 - 14.60	mmol/mol creat
5-Hydroxymethyl-2-furoic acid (Sumiki's acid)	1.07		< 1.70	mmol/mol creat
Arabinose	2.96		< 19.40	mmol/mol creat
Benzoic acid	BDL		< 6.50	mmol/mol creat
Citramalic acid	0.6		< 4.80	mmol/mol creat
Hippuric acid	293.84		28.00 - 610.00	mmol/mol creat
Hydrocinnamic acid/3-phenylpropionic acid	BDL		< 0.219	mmol/mol creat
N-2-Furanylcarbonylglycine	2.47		< 8.40	mmol/mol creat
p-Cresol	1.12		< 118.90	mmol/mol creat
Phenylacetic acid	BDL		< 5.07	mmol/mol creat
Tartaric acid	0.3		< 64.40	mmol/mol creat
Tricarballylic acid	0.18		< 0.44	mmol/mol creat
Urine organic acids: Neurotransmitter intermediates				
4-Hydroxybutyric acid (GABA metabolism)	BDL		< 3.60	mmol/mol creat
5-Hydroxyindoleacetic acid (5-HIAA)	1		< 5.80	mmol/mol creat
Homovanillic acid (HVA)	2.13		< 8.90	mg/mmol creat
Quinurenic acid / Kynurenic acid	BDL		< 4.10	mmol/mol creat
Quinolinic acid	0.27		< 15.10	mmol/mol creat
Vanillactic acid	BDL		< 0.19	mmol/mol creat
Vanillylmandelic acid (VMA)	1.89		< 2.80	mmol/mol creat
HVA/VMA ratio	1.13		0.16 - 1.80	
Quinolinic acid / 5-HIAA ratio	0.27		< 2.00	
Urine organic acids: Nutritional markers				
3-Hydroxy-3-methylglutaric acid (Q10)	0.57		< 5.20	mmol/mol creat
3-Hydroxypropionic acid (Biotin)	2.78		< 11.80	mmol/mol creat
4-Pyridoxic acid (Vit B6)	BDL		< 7.50	mmol/mol creat
Ascorbic acid (Vit C)	**0.05**	**L**	4.60 - 78.00	mmol/mol creat
Glutaric acid (Riboflavin)	**0.29**	**L**	0.70 - 3.60	mmol/mol creat
Methylcitric acid (Biotin)	**1.01**	**L**	1.20 - 1.80	mmol/mol creat
Methylmalonic acid (Vit B12)	0.62		< 2.10	mmol/mol creat
Mevalonic acid (Q10)	BDL		< 0.22	mmol/mol creat
N-Acetylcysteine (Glutathione cycle)	BDL		< 0.13	mmol/mol creat
Pantothenic acid (Vit B5)	BDL		< 4.40	mmol/mol creat
Xanthurenic acid (Vit B6)	BDL		< 1.72	mmol/mol creat

Technical Information: **Mahomani, Vutomi (V) Ms**

GENERAL COMMENTS

BDL: The level of the reported metabolite is below the detection limit of the applied methodology. International reference ranges are currently applied.

South African population based reference ranges have not yet been established.

The uric acid level is determined via the chemical analyser platform with an enzyme based assay

*Essential amino acids.

NUTRITIONAL MARKER COMMENTS

Low or BDL 4-pyrodoxic acid, ascorbic acid, pantothenic, N-acetylcystine may be suggestive of a deficiency/insufficiency in these micronutrient

Elevated glutaric acid, methylcitric acid, 3-hydroxy-3-methyl-glutaric acid, 3-hydroxypropionic acid, mevalonic acid, xanthurenic acid are suggestive of corresponding micronutrient marker deficiency/insufficiency. A low level is insignificant.

Vorster, Chris (B.C.) Prof.

METABOLITE SPECIFIC INTERPRETATION

3-Methylhistidine is a marker of myofibrillar protein degradation with approximately 75% originating from skeletal muscle. Strenuous exercise, hypercortisolism, renal failure, trauma, infection and essentially any catabolic state will increase its concentration. It may also originate from dietary intake in which instance 1-methylhistidine is typically also increased.

An increased excretion of both carnosine and anserine suggests a decreased carnosinase activity but may also be due to increased protein consumption. Carnosinase is a zinc dependant enzyme that converts carnosine and anserine to beta-alanine and, either histidine or 1-methylhistidine respectively. Carnosinase activity has been reported to decrease due to a zinc deficiency and also in chronic liver and neurological disorders. Several physiological benefits have also been linked to a decreased carnosinase activity which complicates the interpretation of a mildly increased carnosine and anserine excretion. Carnosinase deficiency is a metabolic phenotype of questionable significance. In cases previously reported in literature, carnosine and anserine excretion were several folds above the upper reference limit with virtual absence of carnosinase activity. The amino acid profile of this patient is not in keeping with this biochemical phenotype.

Aconitic acid is a Krebs cycle intermediate that is formed from citrate by the action of the aconitase enzyme. Aconitase is likely dependent on normal iron homeostasis and is extremely sensitive to oxidative damage. During hyperammonemia aconitic acid may be excreted in high amounts along with citrate and isocitrate due to the need for a counter anion. Aconitic acid, citrate and isocitrate is also frequently increased along with other Krebs cycle intermediates in patients with coenzyme Q10 deficiency and a mitochondrial respiratory chain insufficiencies.

3,4-Dihydroxyphenylpropionic acid (34DHPPA) and also 3,5-dihydroxyphenylpropionic acid (35DHPPA) results from gut microbial metabolism of polyphenolic compounds, especially caffeic acid, which are found in a variety of plant sources and coffee. Although it was initially thought that clostridial bacteria are primarily responsible for 34DHPPA production, it is now known that other bacteria can also produce it. Moreover, both 34DHPPA and 35DHPPA are now believed to have anti-inflammatory properties. Thus, while exceedingly high levels of 34DHPAA and/or 35DHPPA may be suggestive of gut dysbiosis, milder increases are likely due to an increased intake of polyphenolic compounds and may even be beneficial (PMID: 33238790, 19152477, 33470026, 31583990).

An increased excretion of 4-hydroxyhippuric acid suggests increased glycine conjugation of activated 4-hydroxybenzoate which in turn may be derived from a high load of dietary polyphenols, an increased 4-hydroxybenzoate consumption or increased bacterial metabolism of polyphenolic precursors and/or tyrosine.

Disclaimer: Comprehensive information with regards to tests, methods in use, sample requirements, analyte coverage and expected turnaround times can be viewed at https://pliem.co.za/. It is the responsibility of the requesting clinician to order the correct tests given a particular clinical presentation. The laboratory can assist with test selection if required.

**R = Referred*