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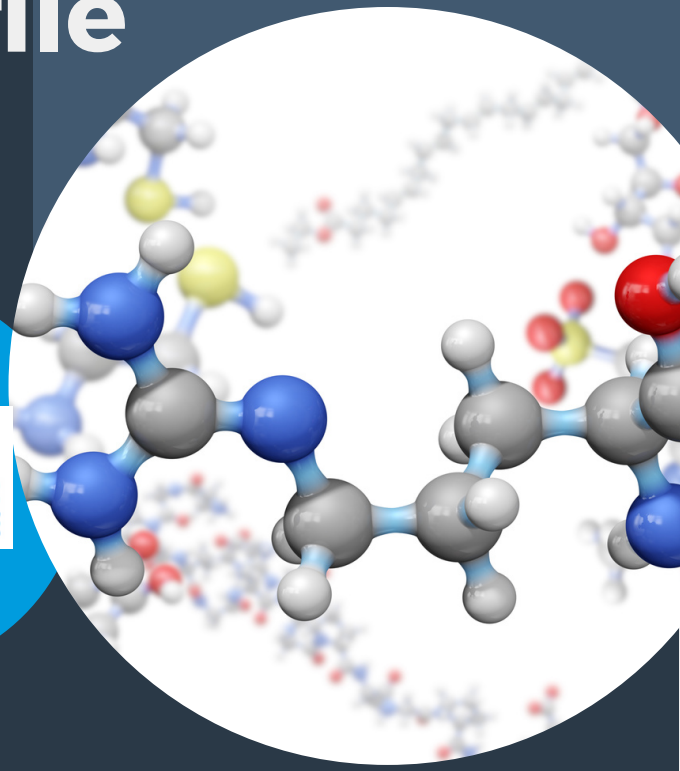
Organic Acids Profile



We break down barriers to personal health management and allow people to live better!

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The Organic Acids Profile is a metabolic snapshot to help you and your patients determine the best course of action in treatment. This urine test looks at metabolic issues, detox impairments, possible dysbiosis, and neurotransmitter metabolites.

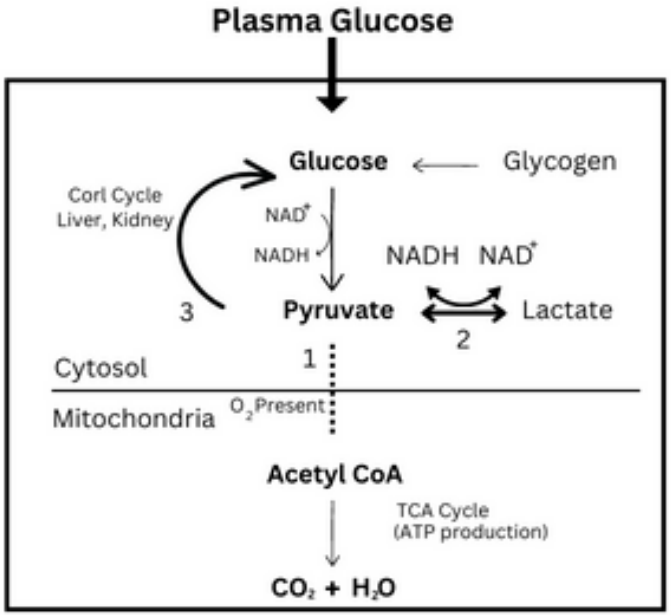
Our test measures 36 organic acid markers to create a unique patient biochemistry profile that reflects how well the body is obtaining and utilizing nutrients.

One morning urine sample would translate the body's biochemistry by analyzing the reflection of the absorption of the nutrients gained from your diet and showing any imbalances in vitamins, minerals, and other cofactors that can affect the body's biochemical needs.

Glycolysis

Pyruvate and Lactate are products of the glycolysis cycle (Figure 1) [1] and are key components of many metabolic processes. High values could indicate problems, either inborn or other causes, in multiple different pathways. There are at least five enzymes in this pathway, where a lack of activity could cause elevations of one or more of the markers in this section[1].
Lactate elevation can be caused by exercise [2].However, several toxins can inhibit mitochondrial ATP synthase. This inhibition can lead the body to produce more lactic acid [3]

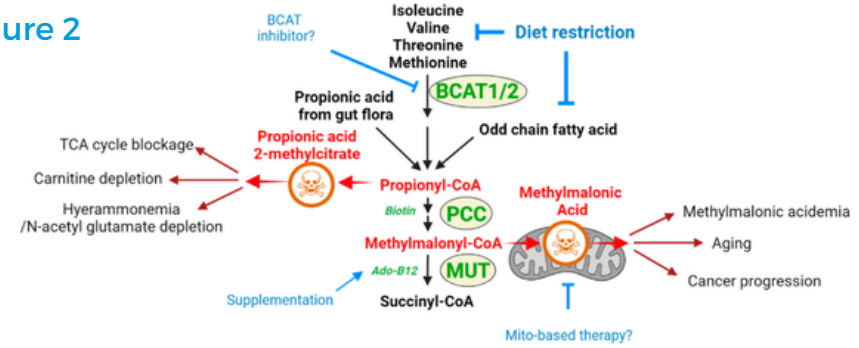
figure 1



Fatty Acid Oxidation, Ketone Metabolites, and Protein Metabolism

Succinyl-CoA is the major endpoint of this pathway, which is used in the TCA cycle (see figure 2). Elevations in these markers can be caused by ketogenic diets or exercise. Extreme elevations could be indicative of Maple Syrup urine disease or branched chain keto aciduria [8]. Branched chain amino acids (BCAA) function as metabolic regulators. However, higher levels have been associated with oxidative stress and mitochondrial dysfunction. These issues can lead to insulin resistance in some individuals [9]

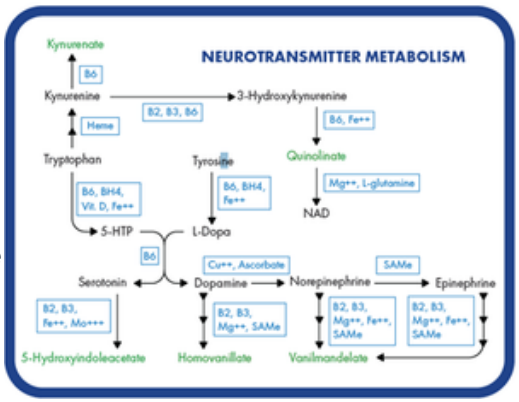
figure 2



Neurotransmitter Metabolism

Neurotransmitters are produced in multiple areas of the body from the central nervous system (CNS), the peripheral nervous system (PNS), and those produced in other parts of the body such as the renal system (see figure 3) . The correlation between the CNS neurotransmitter levels and excreted levels are still being researched, although several studies have suggested a link [10, 11]. However, the enzymes that are present in the CNS use the same cofactors. Elevations in precursors could indicate problems.The ratio between vanilmandelate and homovanillate could indicate low expression or activity of dopamine beta hydroxylase or other enzymes in the pathway [12].

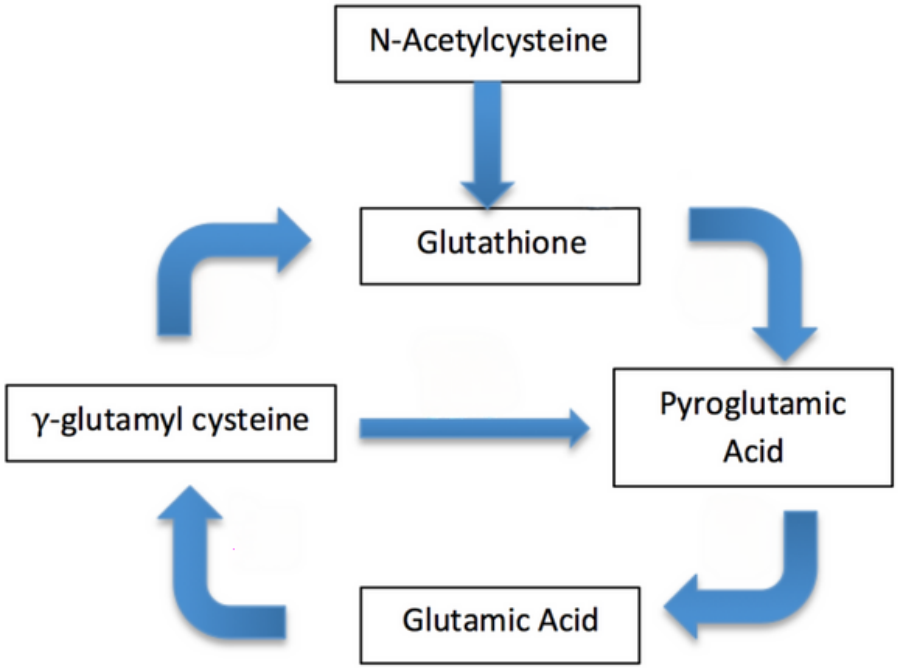
figure 3



Detoxification

Glutathione (GSH) is a non-protein tripeptide consisting of three amino acids: glutamate, cysteine, and glycine. (see figure 4) GSH is eventually decomposed into pyroglutamic acid. High amounts of pyroglutamic acid is an indicator of high oxidative stress [13]. Large amounts of pyroglutamic acid could indicate exposure to mycotoxins or other environmental pollutants. Elevated amounts could also indicate a glycine deficiency [14]. Extremely low amounts could indicate a deficiency in the production of glutathione which would cause an individual to become more sensitive to toxins [15].

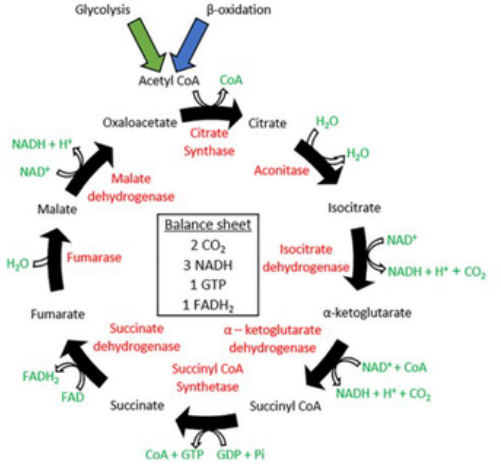
figure 4



Citric Acid Cycle

figure 5

Now known as the TCA cycle (see figure 5) but is also called the Krebs' cycle. This cycle is the predominant producer of ATP in most cells[4]. Dietary fruit consumption of orange, grapefruit, and lemon juices can increase urinary citrate levels [5]. Certain levels in this pathway can be increased by either LPS stimulation or toxins [6, 7].



Bacterial Metabolism

Dysbiosis is a common comorbidity for patients suffering from chronic illness. Identifying an overgrowth of pathogenic bacteria can assist in forming a treatment plan. (see figure 6) Markers such as Para-Hydroxyphenlacetate can indicate an overgrowth of Clostridium difficile [16].

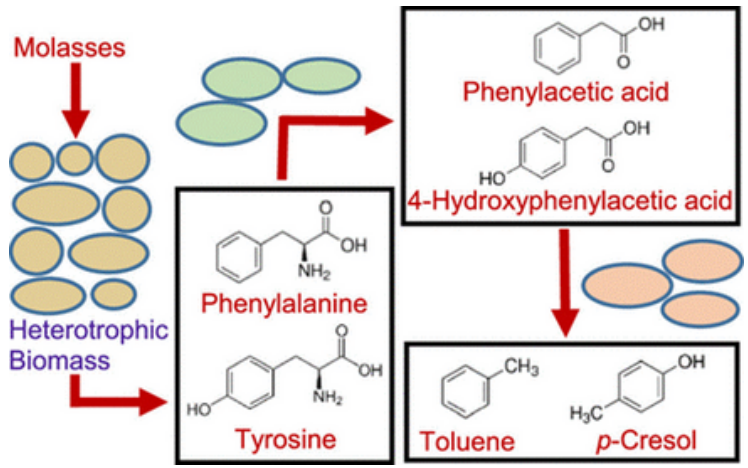


figure 6

Sample Report

Provider: sample
Patient: sample
Accession #: 2000123456

Sex:
Age:
Sample Type: Urine Card

Collected: 2023-04-11
Received: 2023-04-11
Completed:

Analyte	Result (µg/mg creatinine)	Reference Range	Population Percentile
Glycolysis			
1. Pyruvate	1.08	< 1.90	66%
2. Lactate	17.41	< 23.35	83%
Citric Acid Cycle			
3. Citrate	581.24	71.30 - 772.63	86%
4. Cis-Aconitate (H)	53.01	< 40.54	91%
5. Isocitrate (H)	102.83	19.94 - 74.88	97%
6. Alpha-Ketoglutarate (H)	36.08	< 18.94	93%
7. Succinate (H)	62.58	< 20.99	99%
8. Fumarate (H)	>ULOQ	< 1.13	N/A
9. Malate (H)	20.72	< 2.62	97%
Fatty Acid Oxidation			
10. Adipate (H)	14.65	< 4.42	96%
11. Suberate (H)	2.71	< 2.64	90%
12. Ethylmalonate	3.15	< 3.88	83%
13. Methylsuccinate	1.82	< 2.20	82%
Markers for Protein Metabolism			
14. Alpha-Ketoisovalerate	0.35	< 0.49	76%
15. Alpha-Ketoisocaproate	0.99	< 1.09	88%
16. Alpha-Keto-Beta-Methylvalerate (H)	2.91	< 1.29	92%
17. Beta-Hydroxyisovalerate (H)	9.85	< 8.86	90%
18. Methylmalonate	0.70	< 1.64	24%
19. Hydroxymethylglutarate	4.04	< 7.20	38%

Patient: sample
Accession #: 2000123456

Age:
Sample Type: Urine Card

Received: 2023-04-11
Completed:

Analyte	Result (µg/mg creatinine)	Reference Range	Population Percentile
Ketone Metabolites			
20. Alpha-Hydroxybutyrate (H)	4.52	< 1.24	91%
21. Beta-Hydroxybutyrate (H)	>ULOQ	< 8.09	N/A
Markers of Neurotransmitter Metabolism			
22. Vanilmandelate (H)	4.16	< 3.64	90%
23. Homovanillate	3.19	< 6.66	48%
24. 5-Hydroxyindoleacetate	2.27	1.17 - 8.06	37%
25. Quinolinate	2.74	< 5.37	34%
26. Kynurenate	1.25	< 2.49	33%
Markers of Detoxification			
27. Para-Hydroxyphenyllactate (H)	1.80	< 1.55	90%
28. Orotate	0.42	< 1.04	24%
29. Pyroglutamate	34.05	14.58 - 37.47	91%
30. Benzoate	<LLOQ	< 6.87	N/A
31. Hippurate	28.66	17.13 - 768.53	10%
Markers of Bacterial Metabolism			
32. Para-Hydroxybenzoate	0.53	< 1.43	60%
33. Para-Hydroxyphenylacetate	15.96	< 26.39	69%
34. 2-Hydroxyphenylacetate (H)	1.95	< 1.24	93%
35. 3-Indoleacetate	1.71	0.46 - 9.21	45%
36. Tricarballylate	<LLOQ	< 1.06	N/A

References

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