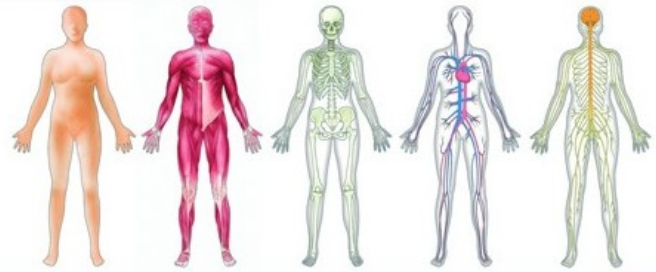


You just don't feel quite right.

The doctor is telling you all your tests are normal!

# Organic Acid Test



It could be a nutritional or biochemical problem which normal testing will not pick up.

## What is Organic Acid Testing?

Conventional medical doctors use a full blood count (FBE), a biochemistry panel, which includes liver function testing, and other tests as general screening tools to help rule out health problems in their patients. However imbalances in the body occur well before abnormal findings are identified on routine testing. Occasionally an abnormal test will come up, however since it doesn't fit a medical condition, the test is ignored and the patient continues to feel unwell.

Organic acids are formed in various tissues or by intestinal microbes. If there is an abnormal accumulation of certain organic acids in urine this can indicate metabolic dysfunction, nutrient deficiencies or microbial overgrowth in the gut.

Abnormal levels of organic acids can be traced to inherited or acquired enzyme deficiencies, build-up of toxins, specific nutrient deficiencies, or drug effects. Every cell is affected when a metabolic pathway is interrupted. Clinical expression of these metabolic defects is unique to each individual, determined by their genetic makeup, medical history, and recent toxin exposures.

From a single urine sample the Organic Acid Test can help identify nutritional and metabolic deficiencies relating to:

- Autism Spectrum Disorders
- Behavioural disorders in children
- Depression
- Cardiovascular disease
- Anxiety
- Insomnia
- Chronic Fatigue
- Multiple chemical sensitivities
- Metabolic Syndrome Obesity
- Intestinal disorders
- Poor libido and fertility
- Chronic pain and inflammation

Organic acid testing can indicate the functional need for specific nutrients, diet modification, antioxidant protection, detoxification, and other therapies.

This is a comprehensive yet convenient test that only requires a single urine sample, collected at your own home. Since it is a non-invasive test, it is ideally suited for assessing children's underlying medical issues.

  
**All Natural Advantage**

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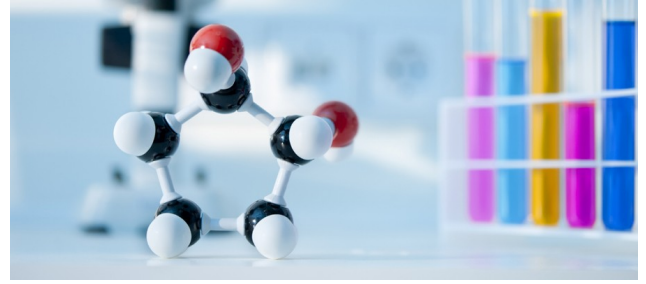
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**Taking the  
guesswork out  
of diagnosis**

## What Can the Organic Acid Test Specifically Tell You?

From a single urine specimen, the Organic Acid Test provides vital information and specific therapeutic options in the areas of:

- ✓ Fatty acid utilisation
- ✓ Carbohydrate metabolism
- ✓ Mitochondrial dysfunction
- ✓ Oxalate issues
- ✓ B group vitamin sufficiency
- ✓ Vitamin C deficiency
- ✓ Methylation sufficiency status
- ✓ Neurotransmitter balance
- ✓ Oxidative damage anti-oxidant sufficiency, glutathione status
- ✓ Detoxification capability
- ✓ Environmental toxin exposure



## What does the test look like and how can it help you?

### Examples of Organic Acid Test results from patients at my clinic.

**Please Note:** Different laboratories that offer Organic Acid testing will report slightly different metabolite panels.

#### Intestinal Microbial Overgrowth

##### Yeast and Fungal Markers

Marker	Reference Range	Result	Interpretation
1 Citramalic	0.11 - 2.0	2.2	H
2 5-Hydroxymethyl-2-furoic	≤ 18	2.2	
3 3-Oxoglutaric	≤ 0.11	0.06	
4 Furan-2,5-dicarboxylic	≤ 13	1.9	
5 Furancarboxylicglycine	≤ 2.3	0.23	
6 Tartaric	≤ 5.3	1.3	
7 Arabinose	≤ 20	37	H
8 Carboxycitric	≤ 20	23	H
9 Tricarballic	≤ 0.58	0.33	

##### Yeast & Fungal Markers

These markers are for yeast/fungal overgrowth in the gastrointestinal tract or from ingested yeast.

Candida (Arabinose) is the most common marker, however it is often found together with other yeast markers.

Treating the yeast often sees a significant improvement in symptoms.

**Clinical picture:** patient was a 4 year old autistic boy exhibiting "silly behaviour" - laughing for no apparent reason and looked like he was just "out of it". Often waking at night and laughing. Antifungal treatment successfully stopped this behaviour, he was more "switched on" and focussed.

##### Malabsorption and Bacterial Markers

Marker	Reference Range	Result	Interpretation
10 2-Hydroxyphenylacetic	≤ 0.86	0.51	
11 4-Hydroxyphenylacetic	2.0 - 32	27	
12 4-Hydroxybenzoic	≤ 3.0	4.2	H
13 4-Hydroxyhippuric	≤ 30	57	H
14 Hippuric	≤ 680	1331	H
15 3-Indoleacetic	0.60 - 14	1.9	
16 Succinic	≤ 23	32	H
17 HPHPA (other pathogenic clostridia species)	≤ 220	315	H
18 4-Cresol (C. difficile)	≤ 84	39	
19 DHPPA (Beneficial Bacteria)	≤ 0.59	1.1	H

##### Malabsorption and Bacterial Markers

Metabolites are present where intestinal bacterial overgrowth is present and exacerbated by malabsorption of digested or undigested food.

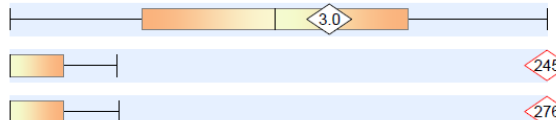
HPHPA and 4-Cresol are markers of Clostridial species overgrowth. These by-products are neurotoxic to the brain and have been implicated in autism, depression, chronic fatigue, tic disorders, etc.

**Clinical picture:** patient was a 6 year old autistic boy exhibiting frequent loose, offensive, stools daily for most of his life. Paediatrician said that it was "just toddlers diarrhoea". Correcting the gut dysbiosis normalised his stools and significantly improved his behaviour.

## Oxalate Metabolites

### Oxalate Metabolites

20	Glyceric	0.21 - 4.9		3.0
21	Glycolic	18 - 81	H	245
22	Oxalic	8.9 - 67	H	276



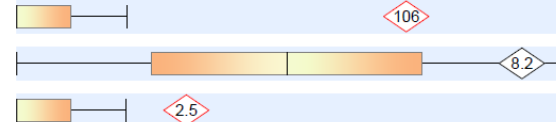
### Oxalate Metabolites

Elevated levels have been associated with autism, vulvar pain, fibromyalgia or genetic disease.

## Glycolytic Cycle Metabolites

### Glycolytic Cycle Metabolites

23	Lactic	2.6 - 48	H	106
24	Pyruvic	0.32 - 8.8		8.2
25	2-Hydroxybutyric	0.19 - 2.0	H	2.5



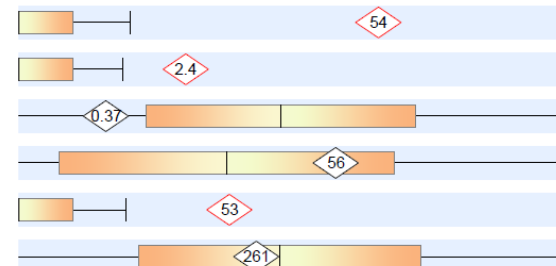
### Glycolytic Cycle Metabolites

Metabolic markers of the efficiency and function of dietary carbohydrate digestion.

## Krebs Cycle Metabolites

### Krebs Cycle Metabolites

26	Succinic	≤ 23	H	54
27	Fumaric	≤ 1.8	H	2.4
28	Malic	≤ 2.3		0.37
29	2-Oxoglutaric	≤ 96		56
30	Aconitic	9.8 - 39	H	53
31	Citric	≤ 597		261



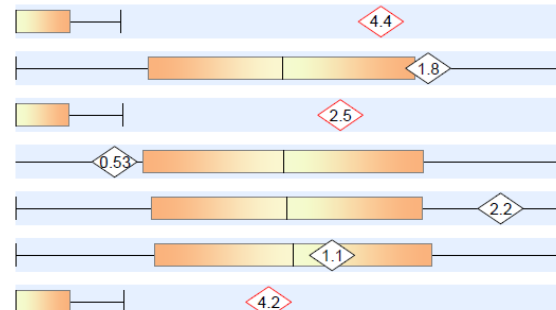
### Krebs Cycle Metabolites

These metabolites are all critical in creating cellular energy production. They can be useful in identifying **mitochondrial dysfunction** and **reduced glutathione levels**.

## Neurotransmitter Metabolites

### Neurotransmitter Metabolites

32	Homovanillic (HVA) <i>(dopamine)</i>	0.39 - 2.2	H	4.4
33	Vanillylmandelic (VMA) <i>(norepinephrine, epinephrine)</i>	0.53 - 2.2		1.8
34	HVA / VMA Ratio	0.32 - 1.4	H	2.5
35	5-Hydroxyindoleacetic (5-HIAA) <i>(serotonin)</i>	≤ 2.9		0.53
36	Quinolinic	0.52 - 2.4		2.2
37	Kynurenic	0.12 - 1.8		1.1
38	Quinolinic / 5-HIAA Ratio	≤ 2.5	H	4.2



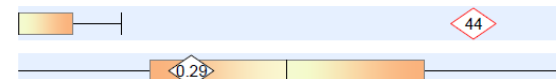
### Neurotransmitter Metabolites

Neurotransmitters are built from amino acids and co-nutrients essential to sustain sufficient brain chemistry. These metabolites are useful in assessing dopamine, norepinephrine and serotonin levels. The Quinolinic/5-HIAA ratio is a useful measure of brain neurotoxicity and inflammation.

## Folate Metabolism

### Pyrimidine Metabolites - Folate Metabolism

39	Uracil	≤ 16	H	44
40	Thymine	≤ 0.91		0.29



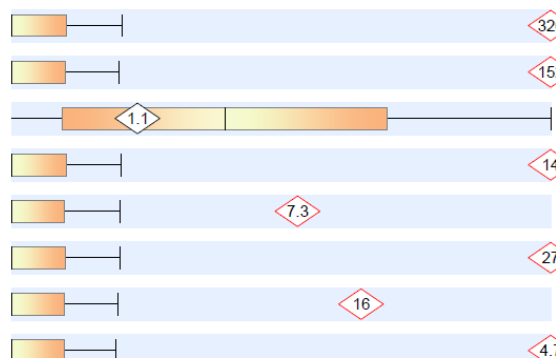
### Pyrimidine Metabolites

Pyrimidine metabolites especially uracil are indicators of folate deficiency and inflammation.

## Ketone and Fatty Acid Metabolism

### Ketone and Fatty Acid Oxidation

41	3-Hydroxybutyric	≤ 4.8	H	326
42	Acetoacetic	≤ 10	H	152
43	4-Hydroxybutyric	≤ 4.7		1.1
44	Ethylmalonic	0.06 - 4.8	H	14
45	Methylsuccinic	≤ 4.0	H	7.3
46	Adipic	0.19 - 6.5	H	27
47	Suberic	≤ 7.0	H	16
48	Sebacic	≤ 0.61	H	4.7



### Ketone & Fatty Acid Metabolism

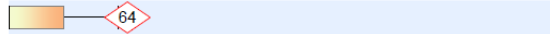
Increased metabolites of ketone and fatty acid metabolism are often associated with fatigue and hypoglycaemia. Mitochondrial function can be affected, supplementation with specific nutrients, like carnitine, can be beneficial.

## Detoxification Markers

### Indicators of Detoxification

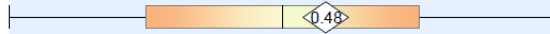
#### Glutathione

57 Pyroglutamic \* 13 - 62 H 64



#### Ammonia Excess

58 Orotic 0.04 - 0.80 0.48



59 2-Hydroxyhippuric ≤ 1.2 0.31



\* A high value for this marker may indicate a Glutathione deficiency.

### Indicators of Detoxification

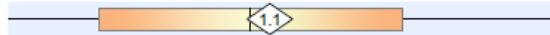
Markers of glutathione deficiency and ammonia excess, provide insights into the capacity and success of the body to process and cope with an increasingly toxic environment.

## Nutritional Markers

### Nutritional Markers

#### Vitamin B12

49 Methylmalonic \* ≤ 2.3 1.1



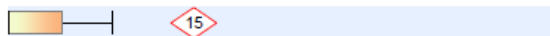
#### Vitamin B6

50 Pyridoxic (B6) ≤ 34 3.9



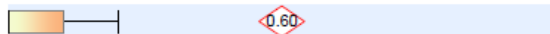
#### Vitamin B5

51 Pantothenic (B5) ≤ 10 H 15



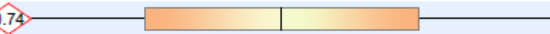
#### Vitamin B2 (Riboflavin)

52 Glutaric \* 0.04 - 0.36 H 0.60



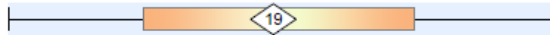
#### Vitamin C

53 Ascorbic 10 - 200 L 0.74



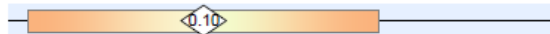
#### Vitamin Q10 (CoQ10)

54 3-Hydroxy-3-methylglutaric \* 0.17 - 39 19



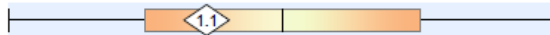
#### Glutathione Precursor and Chelating Agent

55 N-Acetylcysteine (NAC) ≤ 0.28 0.10



#### Biotin (Vitamin H)

56 Methylcitric \* 0.19 - 2.7 1.1



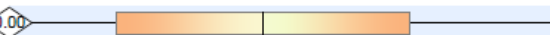
### Nutritional Markers

These markers reflect the body's need for the essential B group vitamins, vitamin C, and N-acetylcysteine. In autistic children nutrients that are frequently low are vitamins B6 and C.

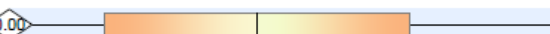
## Amino Acid Metabolites

### Amino Acid Metabolites

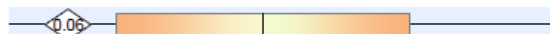
60 2-Hydroxyisovaleric ≤ 0.41 0



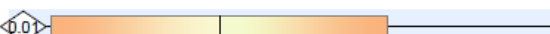
61 2-Oxoisovaleric ≤ 1.5 0



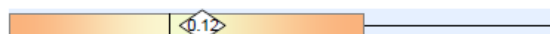
62 3-Methyl-2-oxovaleric ≤ 0.56 0.06



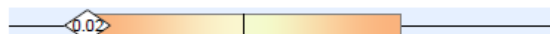
63 2-Hydroxyisocaproic ≤ 0.39 0.01



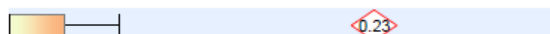
64 2-Oxoisocaproic ≤ 0.34 0.12



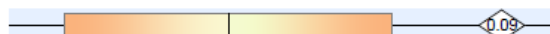
65 2-Oxo-4-methylbutyric ≤ 0.14 0.02



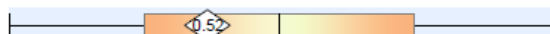
66 Mandelic ≤ 0.09 H 0.23



67 Phenyllactic ≤ 0.10 0.09



68 Phenylpyruvic 0.02 - 1.4 0.52



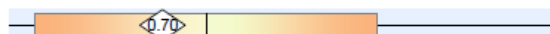
69 Homogentisic ≤ 0.23 0.01



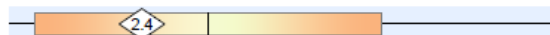
70 4-Hydroxyphenyllactic ≤ 0.62 0.15



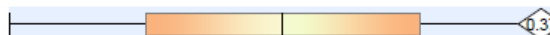
71 N-Acetylaspartic ≤ 2.5 0.70



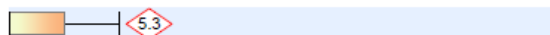
72 Malonic ≤ 9.9 2.4



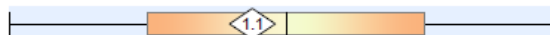
73 3-Methylglutaric 0.02 - 0.38 0.37



74 3-Hydroxyglutaric ≤ 4.6 H 5.3



75 3-Methylglutaconic 0.38 - 2.0 1.1



### Amino Acid Metabolites

These markers are indicators of genetic inborn errors of metabolism. In some cases dietary supplements may be beneficial. Confirmation of some of these disorders requires testing of plasma amino acids.