The Great Plains Laboratory, Inc.
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Upgraded Organic Acids Test Now With Additional Markers

New markers, same great quality, same specimen requirements

The Organic Acids Test

The Organic Acids Test (OAT) provides a metabolic "snapshot" based on the products the body discards through the urine. These small, discarded organic acid molecules are byproducts of human cellular activity, the digestion of foods, and the metabolism of gastrointestinal flora. At certain levels, organic acids in urine may be indicators of toxicity or "markers" of the function of metabolic pathways. Levels of yeast or gastrointestinal bacteria metabolites are compared to normal levels of human metabolites, providing an assessment of yeast and bacterial activity.

The Organic Acids Test includes 74 urinary metabolites (including creatinine) and two neurotransmitter ratios. Recently, two new markers of genetic disease were added to the panel, one of which has been linked to autism.

Importance of the Organic Acids Test

The Organic Acids Test (OAT) offers the most complete and accurate evaluation of intestinal yeast and bacteria. These factors are of critical importance in neurological, gastrointestinal, and movement disorders. Abnormal toxic metabolites of these microorganisms can cause or worsen behavior disorders, hyperactivity, movement disorders, affect energy levels and immune function. Yeast can attach to the intestinal wall causing "leaky gut" syndrome, which can cause or magnify food allergies, impede absorption of vitamins and minerals, and cause intestinal disorders. Many people with chronic illness, allergic conditions, and neurological disorders often have one or more abnormal levels of organic acids in their system. Factors which can cause or affect the intestinal yeast overgrowth include oral antibiotic use, excessive sugars in the diet, selective or combined immune deficiencies, genetic and other factors.

Once any abnormalities are detected, there is a variety of options available to treat the condition. Treatments include antifungal or antibacterial products, probiotic supplementation, vitamins, antioxidants and dietary modification.

Patients and physicians have reported significant improvement upon treatment including: decreased fatigue, regular bowel movements, increased energy and alertness, increased concentration, improved verbal skills, less hyperactivity, better sleep patterns, and decreased abdominal pain.

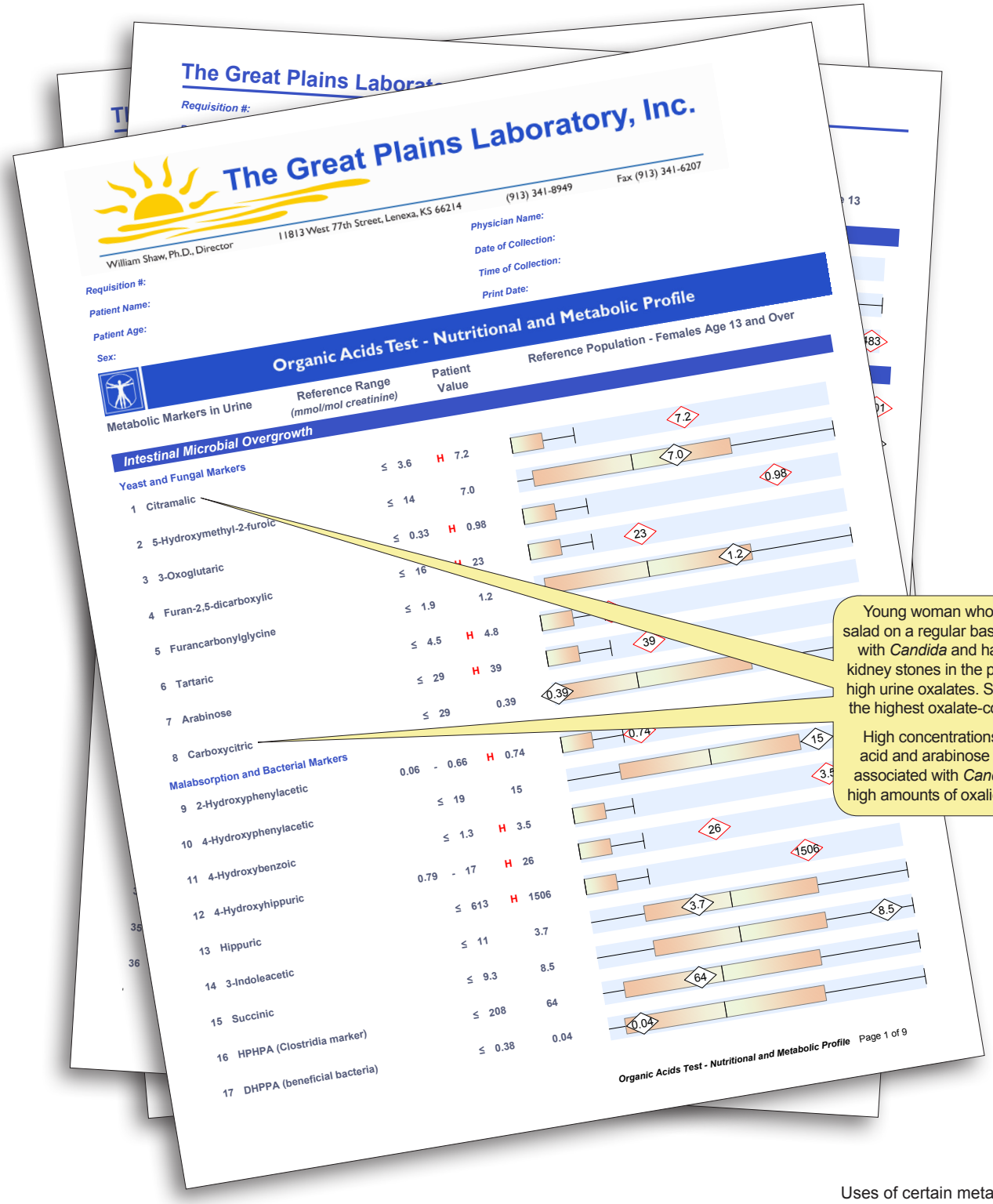
Other Important Markers

Besides the new markers, the OAT still evaluates other important compounds including Krebs cycle metabolites and neurotransmitters. This reliable test detects the overgrowth of yeast and a bacteria species, *Clostridia*, commonly missed by conventional culture methods. These organisms and their metabolites can produce or magnify symptoms of many medical conditions. Identification of a yeast or bacterial overgrowth paired with a successful treatment can increase the probability of recovery.

Recommended for the Following Disorders & Diseases:

- AD(H)D
- Alzheimer's Disease
- Anxiety Disorders
- Asperger's Syndrome
- Autism Spectrum Disorders
- Chronic Fatigue
- Colitis and Crohn's Disease
- Depression
- Down Syndrome
- Endometriosis
- Fibromyalgia
- Gastrointestinal Disorders, Diarrhea or Constipation
- Learning Disabilities
- Movement Disorders
- Multiple Sclerosis
- Obsessive Compulsive Disorder
- Recurrent Infections
- Tic Disorders
- Tourette Syndrome

Organic Acids Test



Young woman who eats spinach salad on a regular basis has problems with *Candida* and has had several kidney stones in the past. Patient has high urine oxalates. Spinach is one of the highest oxalate-containing foods.

High concentrations of citramalic acid and arabinose are frequently associated with *Candida* along with high amounts of oxalic acid (oxalate).

Uses of certain metabolites in the Organic Acids Test in their application to autism are protected by U.S. Patent #5,686,311.

Organic Acids Test

New Markers

3-Hydroxyglutaric Acid – Marker for Genetic Disease

A metabolite associated with the genetic disease glutaric aciduria type I, which is due to a deficiency of glutaryl CoA dehydrogenase, an enzyme involved in the breakdown of lysine, hydroxylysine, and tryptophan. In this disorder, other organic acids (glutaric and glutaconic) will be elevated. Treatment includes special diets low in lysine and supplementation with carnitine or acetyl-L-carnitine.

3-Methylglutaconic Acid – Marker for Mitochondrial Disorder

Significant increase is due to a reduced ability to metabolize the amino acid leucine. This abnormality is found in the genetic disease methylglutaconic aciduria and in mitochondrial disorders. 3-methylglutaric acid may also be elevated. Supplementation with coenzyme Q10, NAD+, L-carnitine and acetyl-L-carnitine, riboflavin, nicotinamide, biotin, and vitamin E may be useful.

4-cresol – Marker for Bacteria Including Selected *Clostridia*

Indicates a possible overgrowth of intestinal bacteria that are specific p-cresol producers. 4-Cresol is a phenolic product poorly metabolized in children with autism. High-potency multi-strain probiotics may help rebalance GI flora.

Tricarballylic Acid – Marker for Exposure to Certain Fungal Contamination in Foods

A chemical by-product released from fumonisins during passage through the gastrointestinal tract. Fumonisins are fungal toxins produced primarily by F. verticillioides. Elevated levels can be caused by the intake of corn or corn-based food contaminated with fumonisins.

Malic Acid – Marker for Mitochondrial Dysfunction

When malic acid is simultaneously elevated with citric, fumaric, and alpha-ketoglutaric acids, it strongly suggests cytochrome C oxidase deficiency, indicating dysfunction in the mitochondrial energy pathways.

Quinolinic Acid – Marker for Inflammation and Neurotoxicity

Quinolinic acid is an organic acid derived from the amino acid tryptophan and can be neurotoxic at high levels. Excitotoxic substances like quinolinic acid may stimulate nerve cells so much that the nerve cells die. Brain toxicity due to quinolinic acid has been implicated in Alzheimer's disease, autism, Huntington's disease, stroke, dementia from old age, depression, HIV-associated dementia, and schizophrenia.

DHPPA – Marker for Beneficial Bacteria

Harmless or beneficial bacteria such as *Lactobacilli*, *Bifidobacteria*, and *E. coli* mediate the breakdown of chlorogenic acid to 3,4-dihydroxyphenylpropionic acid (DHPPA). High values of DHPPA are associated with increased amounts of these bacteria in the gastrointestinal tract.

N-acetylcysteine (NAC) – Marker for Glutathione Precursor & Chelating Agent

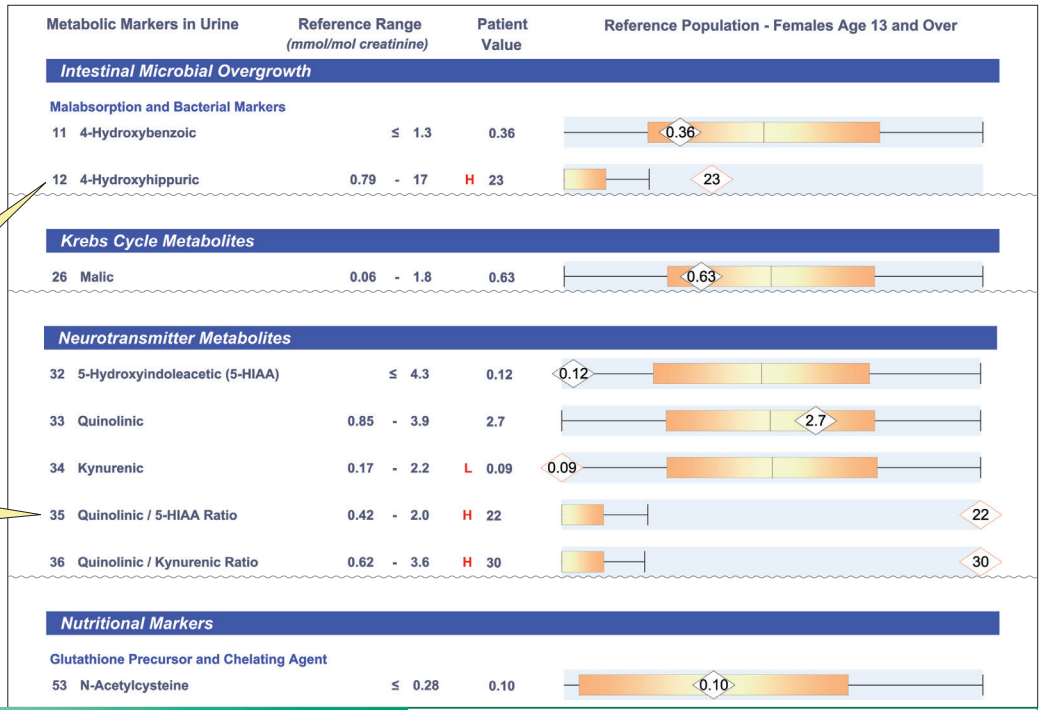
N-acetylcysteine is a powerful antioxidant that acts to increase the glutathione reserves in the body. It is found in body fluids but is also used as a nutritional supplement. It reduces the toxicity of drugs like acetaminophen (Tylenol) and protects against toxicity of mercury and other heavy metals. Low levels could indicate a glutathione deficiency.

Quinolinic Acid / 5-HIAA Ratio – Marker for Neurotoxicity and Inflammation

A high ratio of quinolinic acid to the tryptophan metabolite 5-hydroxyindoleacetic acid, indicates excessive inflammation due to recurrent infections, excessive tryptophan intake, immune overstimulation, excessive adrenal production of cortisol, or excessive exposure to phthalates.

Woman diagnosed with severe depression has high levels of 4-hydroxyhippuric acid, which may be due to bacterial overgrowth of the GI tract, intake of fruits containing polyphenols rich in anthocyanins, flavonols, and hydroxycinnamates such as blueberries, or from paraben exposure.

The patient also has an imbalance of the quinolinic acid/5-HIAA ratio, which indicates excessive inflammation due to recurrent infections, excessive tryptophan intake, immune overstimulation, adrenal over-production of cortisol, or high exposure to phthalates.



Organic Acids Test

Microbial Organic Acids Test

The Microbial Organic Acids Test (included in the Organic Acids Test) is ideal for follow-up to the OAT and may be recommended by practitioners looking for a specific abnormality, to monitor certain microbial balances, or to assess treatment efficacy. We strongly recommend the OAT as the initial screening test.

This test reports 21 components (including Creatinine) such as markers for beneficial bacteria, harmful bacteria, *Clostridia* species, *Candida* species, other yeast and fungal metabolites, and general markers of dysbiosis.

HPHPA -3-(3-hydroxyphenyl)-3-hydroxypropionic acid

HPHPA was first discovered by M. Armstrong and K. Shaw more than 50 years ago when it was found that this compound was elevated in patients of all types in mental hospitals. The source of this compound is a small number of *Clostridia* species. William Shaw, Ph.D., Director of The Great Plains Laboratory, Inc., rediscovered this compound in many patients with psychiatric diseases during research at a major pediatric hospital. Significant decreases in symptoms of schizophrenia, autism, seizure disorders, tic disorders, depression, chronic fatigue syndrome, and AD(H)D have been reported.

After using the Organic Acids Test, many physicians implement an antimicrobial treatment for individuals with elevated urinary concentrations of HPHPA. A number of physicians have indicated that this marker is one of the most clinically significant biochemical markers that they use for symptom management. To view an abstract of the article visit www.ncbi.nlm.nih.gov/pubmed/20423563.

Reference

1. Armstrong M and Shaw K. The occurrence of (-)-β-m-hydroxyphenylhydracrylic acid in human urine. J Biol Chem: 225:269-278, 1957.

Case Study: HPHPA

A patient with severe chronic fatigue and depression was tested for organic acids, which revealed a high concentration of HPHPA, indicating Clostridia overgrowth of the gastrointestinal tract. Symptoms had persisted for a year and a half and the patient had been on complete disability. Treatment with Clostridia-specific antibiotics resulted in a marked decrease (from 1,444 to 13 mmol/mol creatinine) in HPHPA and complete clearing of depression and chronic fatigue. Patient was able to get off of disability and return to work after less than a month of treatment.

Patient Testing Procedure

1. Contact The Great Plains Laboratory, Inc. via phone, fax, e-mail, or on our website to order a test kit.
2. You will receive a Test Requisition Form along with the test kit. Fill out the form indicating the payment method or insurance information. If you are in the U.S, have this form signed by a medical practitioner.
3. Follow the instructions to collect the sample.
4. Send the sample with the paperwork in the pre-paid express overnight envelope included in the test kit (shipping cost is included in the price for U.S. clients).
5. The results will be mailed with a detailed explanation to the patient and medical practitioner in approximately one to three weeks after receiving your sample, unless the practitioner has specified otherwise.
6. A free phone consultation with our nutritional consultant is available to practitioners and patients upon request.