SPECIAL REPORT:

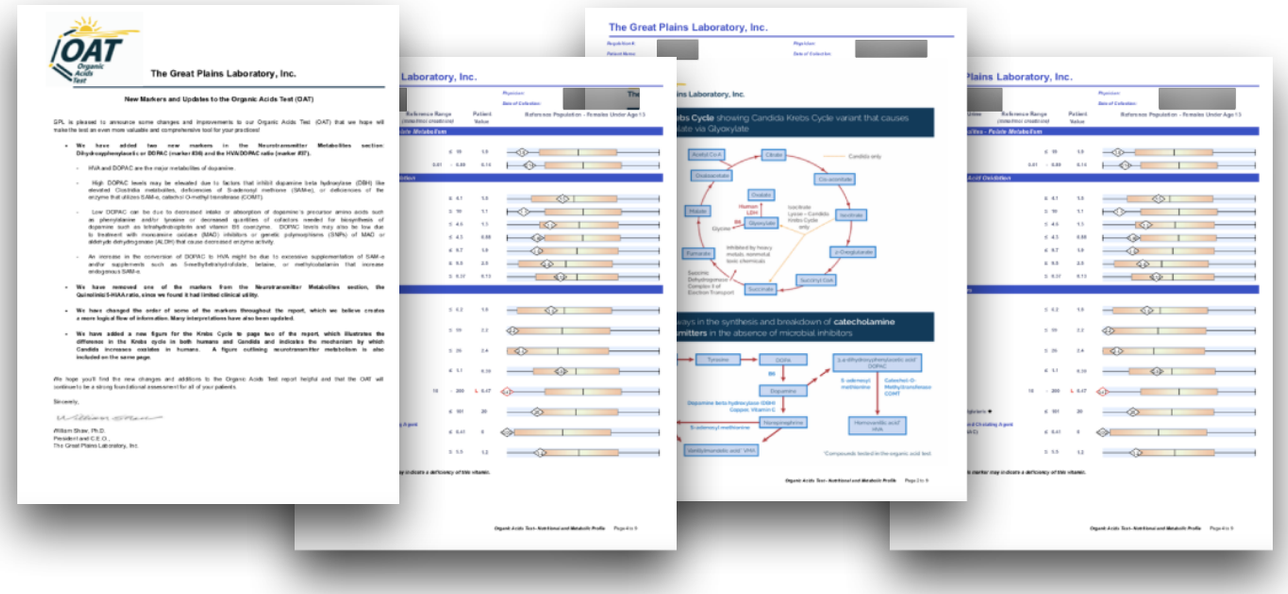
Understanding the Power of the Organic Acids Test Marker by Marker

by Kurt N. Woeller, D.O.

AdvancedOATMasteryCourse.com

"The Organic Acids Test (OAT) is the single greatest test that every health care practitioner should know how to interpret and use in their practice."

-Kurt N. Woeller, D.O.



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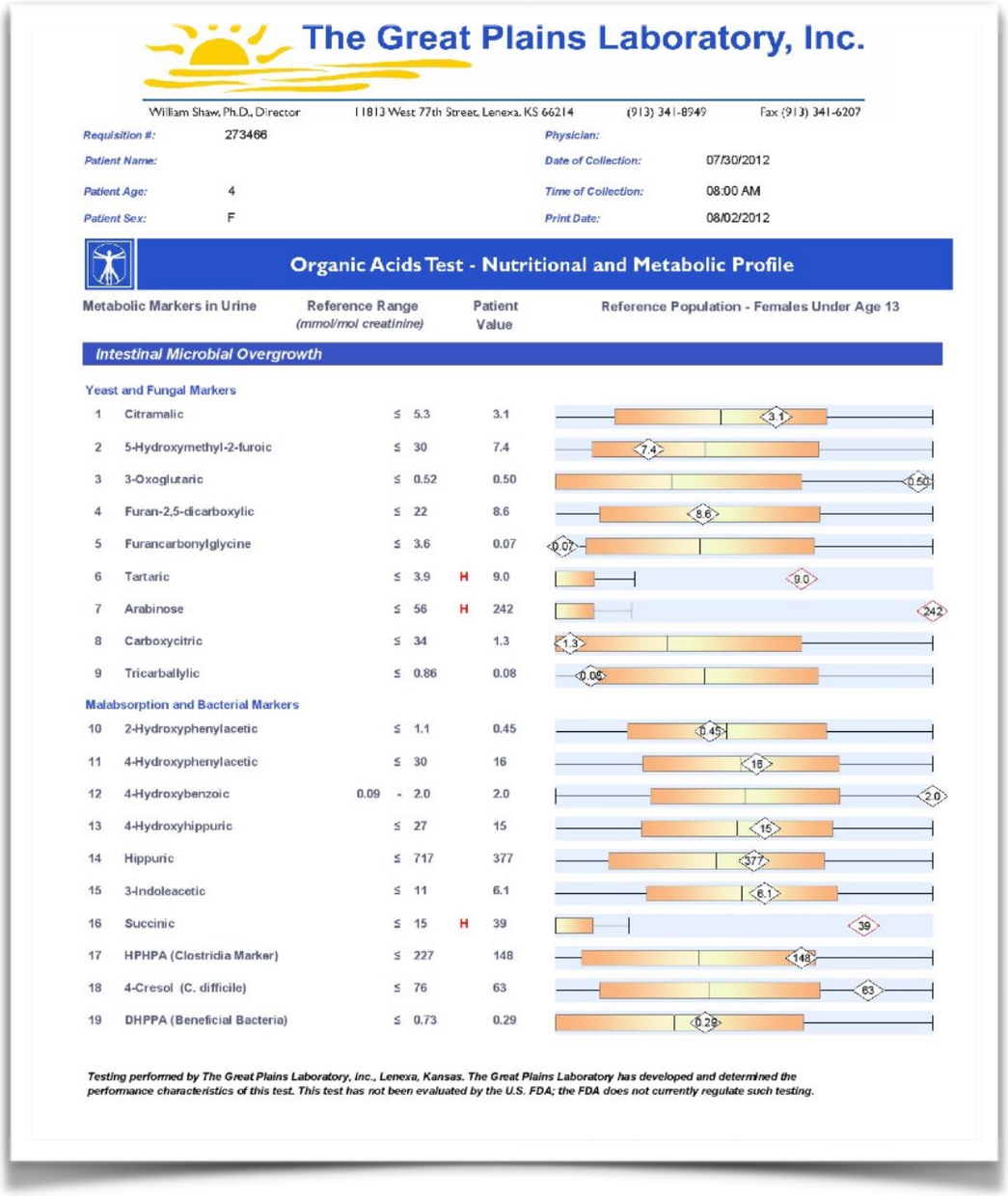
Health care is in a crisis. The high cost of medicines, procedures and insurance premiums are forcing people to seek alternatives for their health problems.

People realize that conventional medicine *(a.k.a. traditional medicine)* is limited in helping people with many chronic ailments. This realization has instigated a movement in self-care through internet resources, *do-it-yourself* treatments, and seeking out practitioners trained in alternate ways of administering health care.

Fortunately, there are tools that YOU, as a health care practitioner, can implement for patients to achieve better health and wellness and discover the root causes of their chronic health concerns.

The Organic Acids Test is one of the best tools available today.

What Is The Organic Acids Test (OAT)?



The Great Plains Laboratory, Inc.

William Shaw, Ph.D., Director 11813 West 77th Street, Lenexa, KS 66214 (913) 341-8949 Fax (913) 341-6207

Requisition #: 273466 Physician:
Patient Name: Date of Collection: 07/30/2012
Patient Age: 4 Time of Collection: 08:00 AM
Patient Sex: F Print Date: 08/02/2012

Organic Acids Test - Nutritional and Metabolic Profile

	Metabolic Markers in Urine	Reference Range (mmol/mol creatinine)		Patient Value	Reference Population - Females Under Age 13
Intestinal Microbial Overgrowth					
Yeast and Fungal Markers					
1	Citramalic	≤ 5.3		3.1	
2	5-Hydroxymethyl-2-furoic	≤ 30		7.4	
3	3-Oxoglutaric	≤ 0.52		0.50	
4	Furan-2,5-dicarboxylic	≤ 22		8.6	
5	Furancarbonylglycine	≤ 3.6		0.07	
6	Tartaric	≤ 3.9	H	9.0	
7	Arabinose	≤ 56	H	242	
8	Carboxycitric	≤ 34		1.3	
9	Tricarballylic	≤ 0.86		0.08	
Malabsorption and Bacterial Markers					
10	2-Hydroxyphenylacetic	≤ 1.1		0.45	
11	4-Hydroxyphenylacetic	≤ 30		16	
12	4-Hydroxybenzoic	0.09 - 2.0		2.0	
13	4-Hydroxyhippuric	≤ 27		15	
14	Hippuric	≤ 717		377	
15	3-Indoleacetic	≤ 11		6.1	
16	Succinic	≤ 15	H	39	
17	HPHPA (Clostridia Marker)	≤ 227		148	
18	4-Cresol (C. difficile)	≤ 76		63	
19	DHPPA (Beneficial Bacteria)	≤ 0.73		0.29	

Testing performed by The Great Plains Laboratory, Inc., Lenexa, Kansas. The Great Plains Laboratory has developed and determined the performance characteristics of this test. This test has not been evaluated by the U.S. FDA; the FDA does not currently regulate such testing.

An OAT is an accurate assessment of what is happening metabolically in the body. The OAT evaluates for over 75 urinary metabolites *(a.k.a. organic acids)* that can be useful for discovering underlying causes of chronic illness.

Treatments based on OAT findings often lead to improved energy, sleep and mental health conditions, as well as reduced attention and concentration problems, chronic pain, digestive issues and neurological disorders.

It is the single greatest test that every health care practitioner should know how to interpret and use in clinical practice.

What Are Organic Acids (OA)?

Organic acids are chemical compounds excreted in the urine of mammals that are products of metabolism. They are substances in which carbon and hydrogen are always present, but may also contain the elements of oxygen, nitrogen, sulfur and phosphorus. Examples of OA's are lactic acid linked to glucose metabolism and often elevated in metabolic problems, physical stress, poor blood flow, bacterial infections, mitochondrial dysfunction, mold toxicity and even sleep apnea. Another organic acid comes for various species of clostridia bacteria in the digestive system called HPHPA *(3-(3-hydroxyphenyl)-3-hydroxypropionic acid)*. This compound is a strong inhibitor of nervous system dopamine metabolism which is linked to neurological diseases such as Parkinson's disease, various mental health disorders and autism.

From the Great Plains Laboratory's webpage on the OAT, "organic acids are most commonly analyzed in urine because they are not extensively reabsorbed in the kidney tubules after glomerular filtration. Organic acids in urine are often present at 100X their concentration found in the blood. To date, there are over a thousand different organic acids detected."

Who Is The OAT Beneficial For?

The Organic Acids Test is for any individual with a chronic health condition where you suspect metabolic toxins or biochemical imbalances may be a causative or contributing factor. The following is a short list of health disorders, but not exclusive, where the OAT can be helpful:

- Autism
- ADD/ADHD
- Autoimmune
- Chronic fatigue
- Digestive problems
- Metabolic disorders
- Mental health conditions
- Neurological diseases

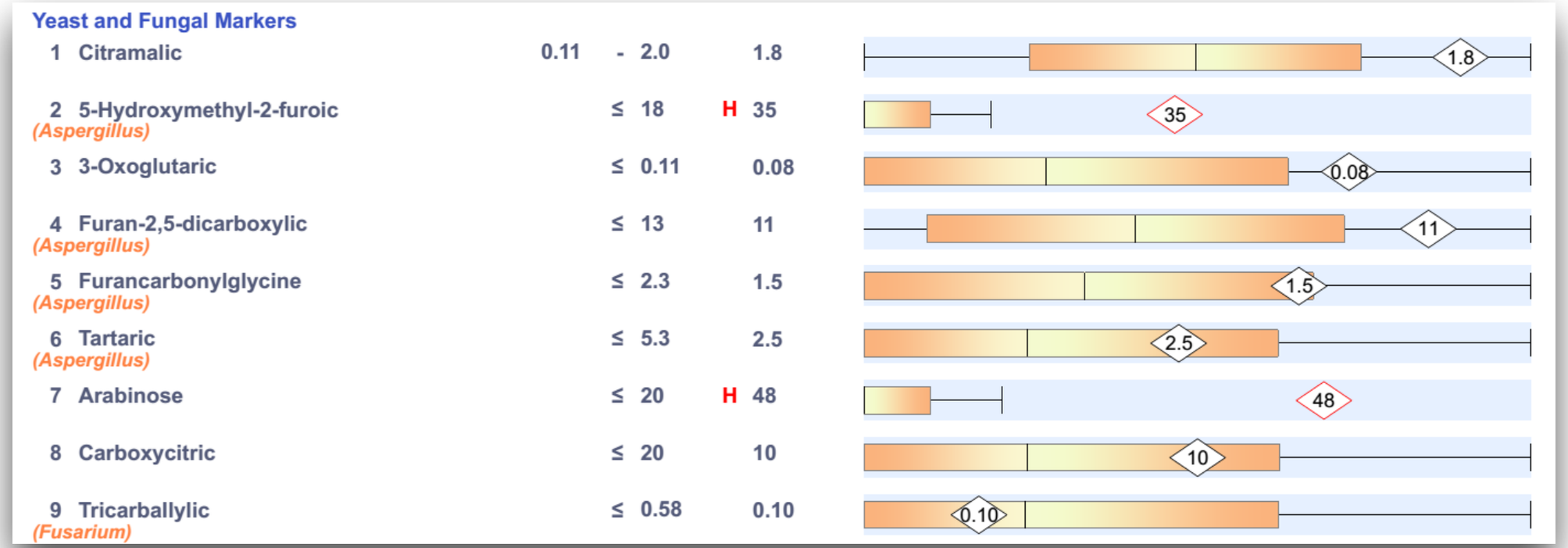
How Exactly Can The OAT Be Helpful In Clinical Practice?

Here are the top10 reasons why you should learn how to utilize the Organic Acids Test:

1. The OAT evaluates for various fungal toxins, including specific markers for candida. Many people rely on stool testing for candidiasis diagnosis. However, the stool is often negative for candida overgrowth while the OAT detects the presence of candida toxins. The OAT is overall more sensitive for candida analysis.

Candida toxins can create problems with brain function including memory, attention and focus issues. Special needs individuals can often have erratic behavior such as silliness, goofiness and inappropriate laughter associated with elevated levels of candida. These behaviors can also be seen along with bloating, gas and other digestive complaints. For some people, candida leads to chemical sensitivity, as well as muscle aches and pain.

The OAT also has markers indicating mold exposure, such as Aspergillus, which can produce toxic compounds which are damaging to the brain, liver, kidneys and immune systems *(see Figure below)*.



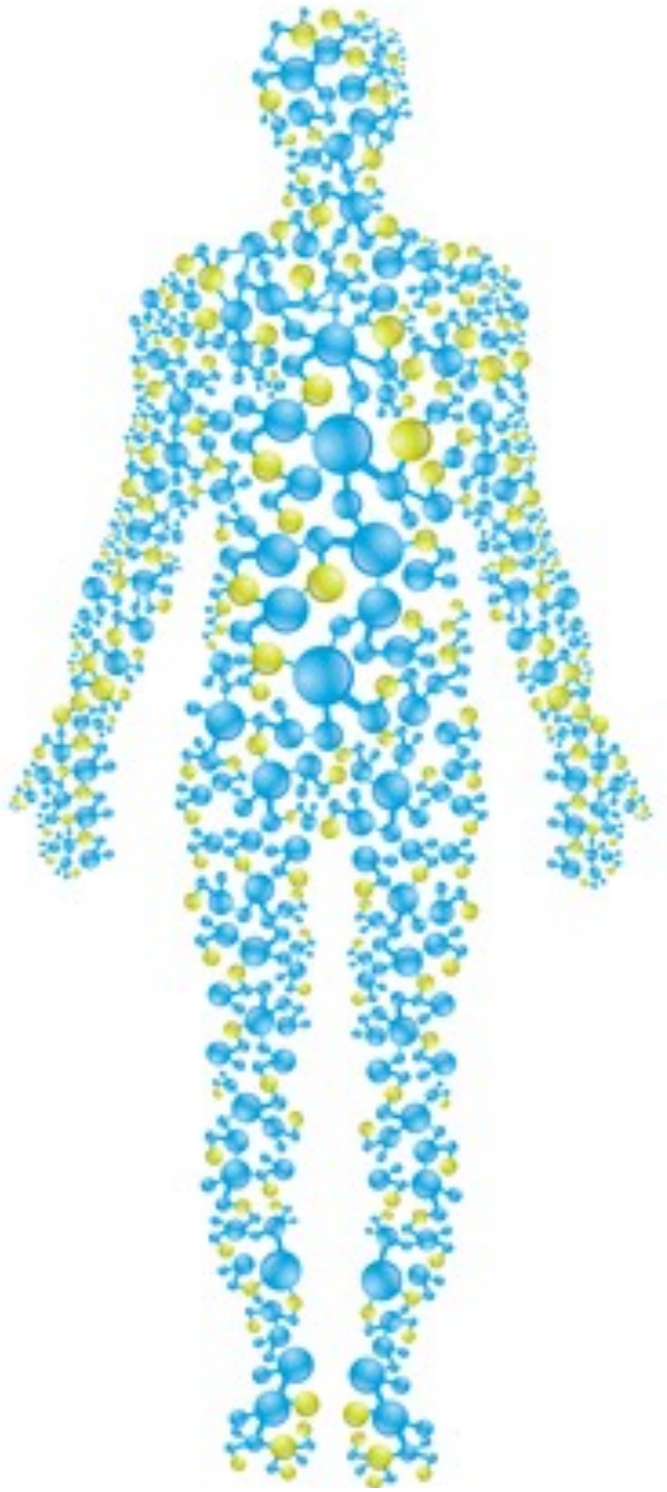
The Yeast and Fungal Marker section of the OAT evaluates for many fungal markers. Marker #7 (Arabinose) is linked to invasive candida and Marker #2 (5-Hydroxymethyl-2-furoic) is produced by Aspergillus mold. Other markers such as #2, #5 and #9 are associated with mold exposure too, including Fusarium, associated with the compound Tricarballylic.

2. The OAT evaluates for specific toxins related to clostridia bacteria. Certain clostridia bacteria such as Clostridia difficile can lead to digestive problems and poor health[1].

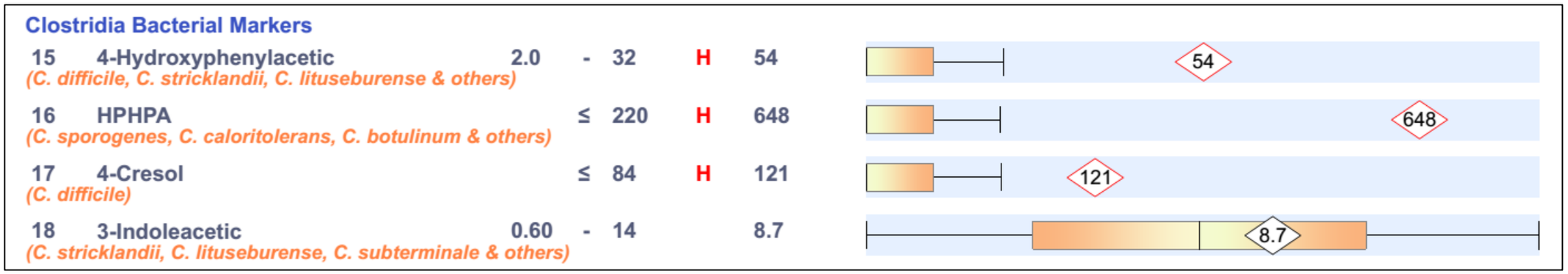
The most common toxins evaluated on the OAT linked to different strains of clostridia are HPHPA and 4-cresol[2].

Both HPHPA and 4-cresol can inhibit a dopamine converting enzyme leading to excess dopamine in the brain and nervous system[3].

High dopamine can form toxic compounds that adversely affect brain cells. This can cause mood instability and other cognitive problems. In severe cases, the presence of these clostridia toxins can trigger aggressive and self-injury behavior from high amounts of dopamine.



Digestive system problems are also common with the presence of these toxins. Evaluating for clostridia toxicity is very important and should not be overlooked in the health assessment for any individual with chronic health problems (*see Figure below*).



The Clostridia Bacteria Markers section of the OAT profile has four different clostridia bacteria toxins. HPHPA is most common and 4-Cresol is the second most prevalent marker to show up on the OAT. Both 4-Cresol and 4-Hydroxyphenylacetic acid can be produced by certain strains of Clostridia difficile.

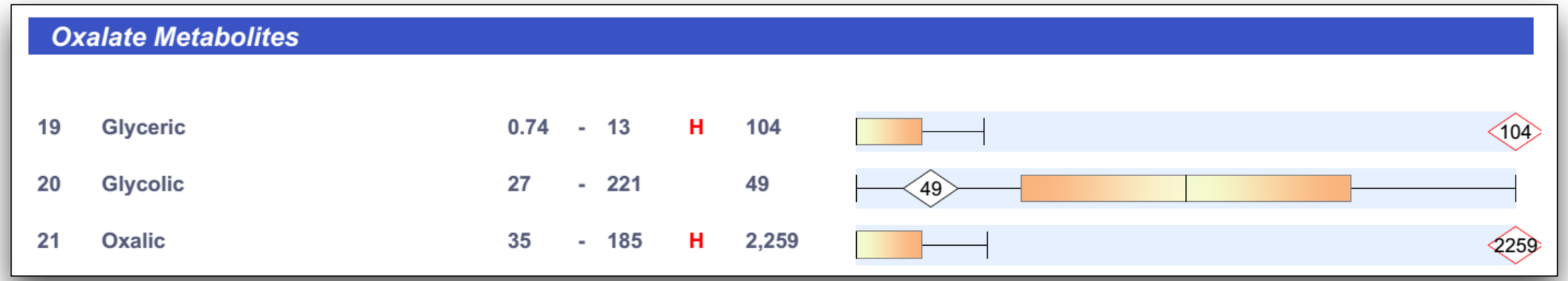
3. By learning how to interpret the OAT you, as a healthcare practitioner, can best prioritize treatment intervention between candida and clostridia. People often assume digestive and physical problems are specifically related to a candida. However, treating for candida when clostridia bacteria toxins of HPHPA and 4-cresol are present can lead to significant problems, e.g. worsening of symptoms overall. Therefore, having a clear picture of which OAT markers are present is critical to correct intervention.

4. The OAT evaluates for high oxalate (oxalic acid). Oxalate is a compound found in many foods such as nuts (e.g., almonds), fruit (e.g., berries) and certain vegetables (e.g., spinach).

Oxalate can also be produced by the presence of candida, as well as certain metabolic imbalances linked to deficiency in oxalate converting enzymes.

Certain molds also produce oxalate. High oxalate is often associated with joint and muscle pain but can lead to bladder and bowel discomfort as well. Severe cases of oxalate accumulation lead to kidney stones. Oxalate can trap heavy metals such as mercury, lead and arsenic in the body and lead to mineral imbalances.

Autistic individuals who have high oxalates are often moody, irritable and agitated *(see Figure below)*.



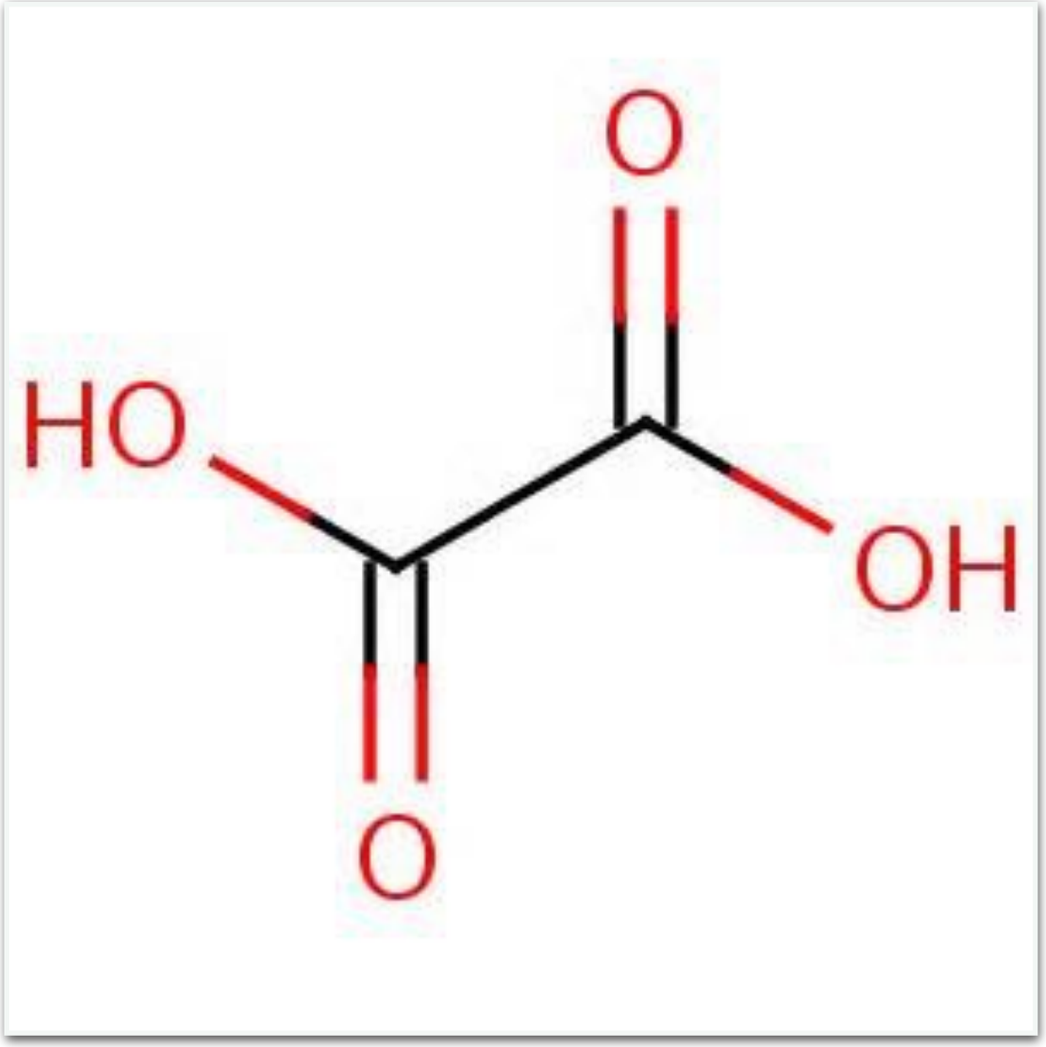
The Oxalate Metabolites section of the OAT evaluates for Oxalic and two other compounds. In this example, marker 21 is extremely high. This can occur from a high oxalate diet, mold and candida contributions and genetic influences *(marker 19, Glyceric)*.

The high oxalate situation alone is one reason to incorporate the OAT into clinical practice. Many people suffer from high oxalate problems and don't know it.

Years of chronic pain can occur from misdiagnosis and treatment, when the OAT may reveal the true problem.

Oxalic acid is the most acidic acid in body fluids. In large amounts, it can lead to oxalate crystal formation in the kidneys. However, oxalate crystals can also accumulate elsewhere, e.g. thyroid.

Oxalic acid detection, through comprehensive Organic Acids Testing, has a lot of clinical usefulness in any functional/integrative medicine practice. People often present with a myriad of seemingly unrelated symptoms. On the next page is a case of an individual who presented with significant body aches, tendon pain, and bladder discomfort.



Chemical Structure of Oxalic Acid

A 43-year old female presented to our practice with a history of the following:

- Pressure headaches
- Fatigue, brain fog
- Body aches and tendon pain
- Cyclical urinary pain *(sharp)*
- Digestive discomfort *(bloating, painful bowel movements)*

These complaints had been going on for many years. She had been tested on many occasions for bladder infection all coming back normal.

Her past medical history was significant for Blastocystis hominis and Cryptosporidium parvum infections *(treated successfully),* Raynaud's phenomenon *(reduced blood flow in response to cold or emotional stress causing discoloration of fingers and toes),* and irritable bowel syndrome. She took periodic Ibuprofen and Atarax *(for suspected interstitial cystitis)*.

One interesting fact obtained on clinical history was her “extreme muscle pain” when she ate nuts and vegetables. No other doctor had given much thought to this statement. Oxalic acid in high amounts is often found in nuts such as almonds and certain vegetables such as beets and spinach.

Our suspicion based on her complaints was an elevated oxalic acid which was confirmed by testing to show oxalic acids over 350 (which is significantly high).

Oxalate Metabolites

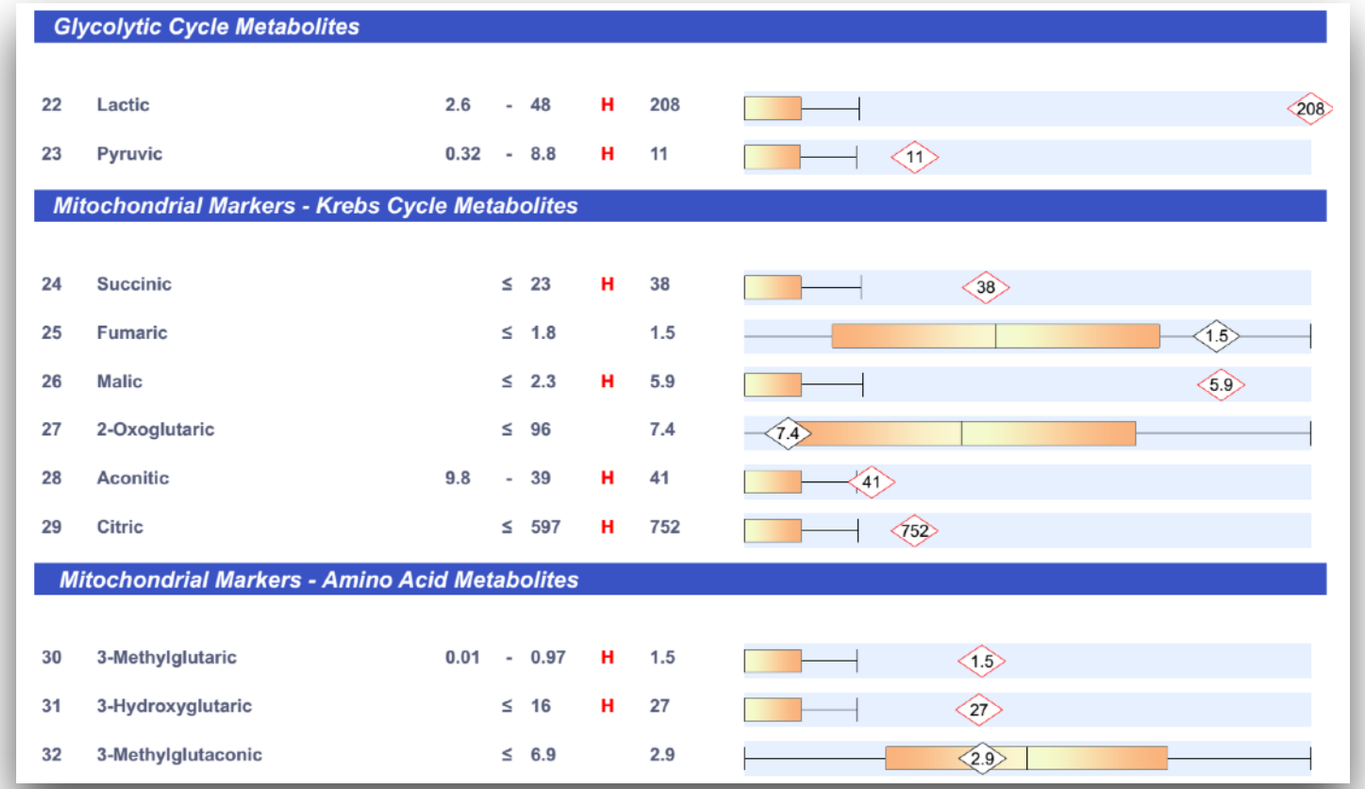
20	Glyceric	0.77	-	7.0		3.2
21	Glycolic	16	-	117		45
22	Oxalic	6.8	-	101	H	399

Patient was given following instructions:

- Avoid all soy, nuts (including butters), berries (including jam and juice), and spinach. She was told to self-evaluate her diet for other high oxalate foods.
- Put on approximately 250mg of calcium citrate and 100mg of magnesium citrate with each meal (breakfast, lunch, and dinner). The citrated form of these minerals helps to bind oxalates in the digestive system and prevents them from being absorbed.
- High dose probiotic at 225 billion organisms per dose. This helps to degrade oxalates in the digestive tract.
- L-Arginine at 1000mg daily. Clinical benefit of L-Arginine in high oxalate problems is to decrease tissue pain, particularly bladder discomfort.
- Epsom Salt Bath at least 4 times weekly, 1 to 2 cups as tolerated in bathwater. Epsom salt helps to soothe the skin and aids in the body's processing of oxalates.

Her response was impressive. Over the next 3 months, she reported complete elimination of bladder/urinary pain, and approximately an 80% improvement in muscle and tendon discomfort. Bowels became more regular and non-painful. Fatigue had improved by about 50%. In addition, patient no longer experienced Raynaud's phenomenon when exposed to cold temperatures.

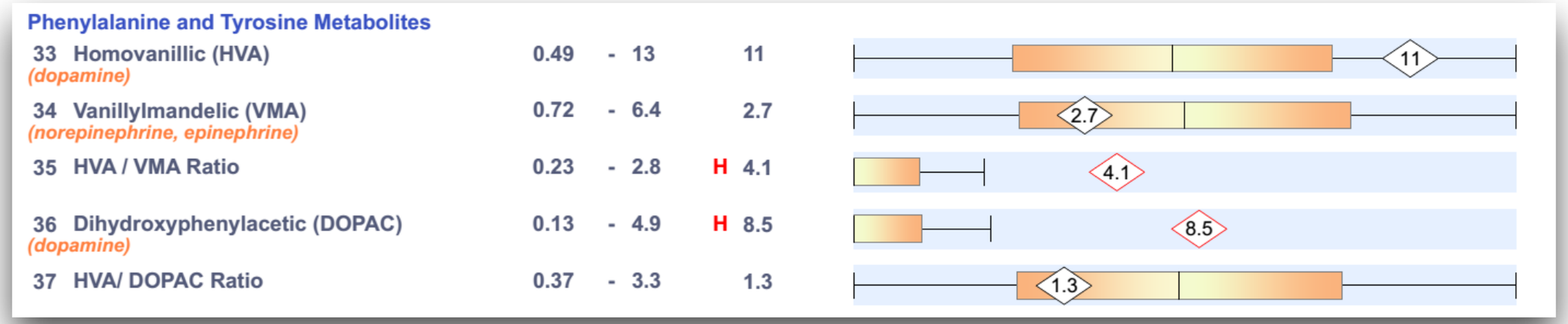
5. The OAT evaluates for mitochondrial imbalances. The mitochondria are the energy factories of our cells. They are often stressed because of toxins from candida, bacteria, oxalate, heavy metals and environmental chemicals. Mitochondrial dysfunction is quite common in chronic health problems *(see Figure below)*.



Glycolytic Cycle Metabolites						
22	Lactic	2.6 - 48	H	208		208
23	Pyruvic	0.32 - 8.8	H	11		11
Mitochondrial Markers - Krebs Cycle Metabolites						
24	Succinic	≤ 23	H	38		38
25	Fumaric	≤ 1.8		1.5		1.5
26	Malic	≤ 2.3	H	5.9		5.9
27	2-Oxoglutaric	≤ 96		7.4		7.4
28	Aconitic	9.8 - 39	H	41		41
29	Citric	≤ 597	H	752		752
Mitochondrial Markers - Amino Acid Metabolites						
30	3-Methylglutaric	0.01 - 0.97	H	1.5		1.5
31	3-Hydroxyglutaric	≤ 16	H	27		27
32	3-Methylglutaconic	≤ 6.9		2.9		2.9

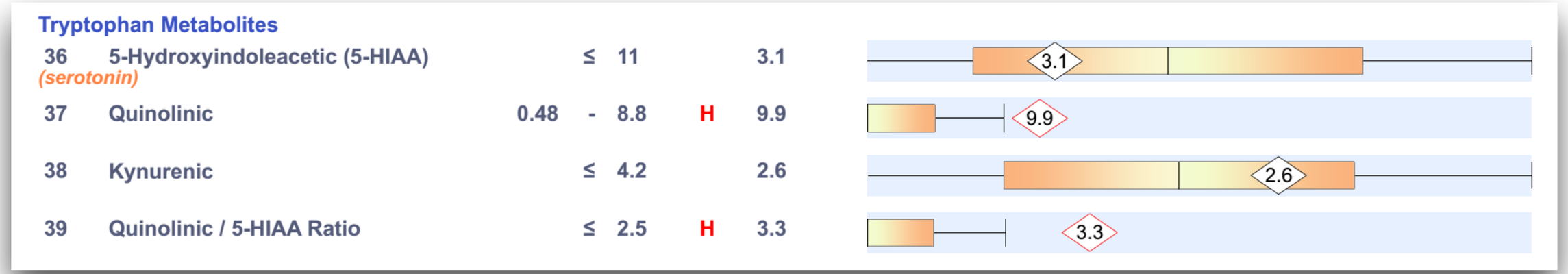
The OAT has three sections that evaluate for mitochondrial dysfunction. In this example there are many elevated markers. Lactic *(marker 22)* can be linked to many physical stressors, including mold exposure. Marker 24 *(Succinic)* is common with chemical toxins and high Malic and Citric are often seen with digestive fungal overgrowth.

6. The OAT evaluates for imbalances in dopamine and norepinephrine (4), as well as DOPAC *(linked to dopamine)* and various neurochemical ratios. The balance between these two important brain chemicals is critical for attention, focusing, mood, calmness and other functions of the nervous system *(see Figure below)*.



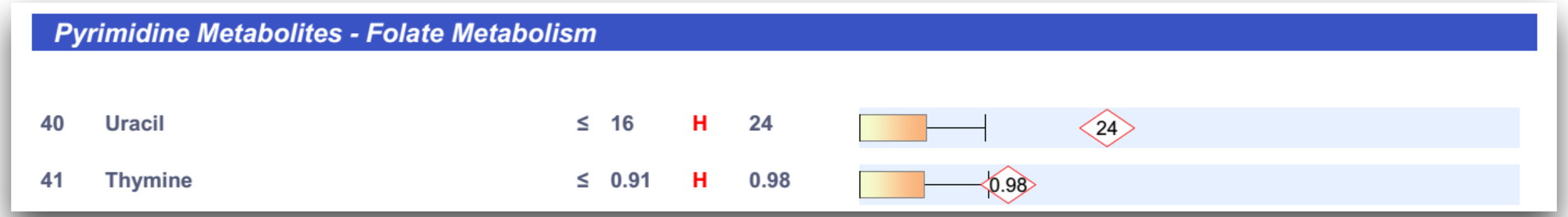
This section of the OAT helps to define dopamine and norepinephrine imbalances. High DOPAC is seen with dopamine problems related to methylation imbalances and the deficiency of S-Adenosyl-Methionine (SAMe). High levels of HVA can be associated with a problem in the dopamine to norepinephrine converting enzyme called Dopamine Beta-Hydroxylase.

7. The OAT evaluates for imbalances in serotonin, an important brain chemical for mood, fine and gross motor skills, calmness and sleep. There are other markers evaluated on the OAT that can indicate toxic stress in the brain and nervous system. One of these toxic metabolites is called quinolinic acid (QA). Elevated QA is indicative of toxic stress in the brain and is important to evaluate before implementing the amino acid L-Tryptophan which is used to help with sleep disorders *(see Figure below)*.



5-Hydroxyindoleacetic (5-HIAA) is linked to serotonin status and when low can contribute to anxiety, depression and mood disorders. The high Quinolinic seen in this example is common from individuals with chronic infections and stress. High QA can be damaging to the brain and nervous system.

8. The OAT evaluates for two specific chemicals related to folate metabolism. Folate is part of the methylation cycle that supports the inner workings of the cells related to DNA and RNA function. Poor folate metabolism can lead to cognitive problems often seen in autism, Alzheimer's and certain mental health disorders (*see Figure below*).



In this example, both the Uracil and Thymine are elevated indicating significant folate imbalance and/or a conversion defect *(linked to the MTHFR enzyme)*. In people with either elevated Uracil or Thymine the use of folate supplementation is often warranted.

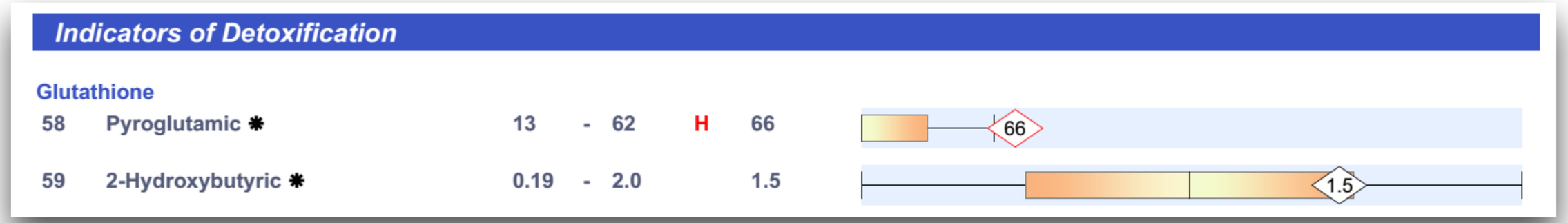
9. The OAT evaluates for various nutritional markers such as vitamin B6, vitamin B5, vitamin C, CoQ10, as well as N-acetylcysteine (NAC). NAC is necessary for glutathione production *(see Figure below)*.

Nutritional Markers

Vitamin B12							
50	Methylmalonic ✱		≤ 5.2		0.16	0.16	
Vitamin B6							
51	Pyridoxic (B6)		≤ 53	H	71	71	
Vitamin B5							
52	Pantothenic (B5)		≤ 14	H	118	118	
Vitamin B2 (Riboflavin)							
53	Glutaric ✱		≤ 1.4	H	6.9	6.9	
Vitamin C							
54	Ascorbic	10	- 200		15	15	
Vitamin Q10 (CoQ10)							
55	3-Hydroxy-3-methylglutaric ✱		≤ 88	H	255	255	

There are many useful markers in the Nutritional Markers section of the OAT. In this example, high Vitamin B6 is most likely from taking B6 supplement. However, the high marker for Vitamin Q10 indicates there is a deficiency of this nutrient. Low Q10 is a contributing factor to mitochondrial dysfunction. High Glutaric is often associated with digestive yeast overgrowth.

10. The OAT evaluates for glutathione deficiency. Glutathione is a powerful antioxidant in our cells and protects against toxicity. The lack of glutathione leads to oxidative stress within the brain and nervous system which causes poor attention, focusing and overall cognitive challenges. Glutathione deficiency can also compromise immune system health. Glutathione deficiency is common in many chronic health problems *(see Figure below)*.



The elevated Pyroglutamic is associated with a glutathione deficiency. This is common in people with chronic illness, particularly those linked to toxin exposure. Glutathione deficiency is associated with many diseases and low glutathione is a common factor in mitochondrial dysfunction.

Final Comments

The main ingredient for success in integrative medicine for any practitioner is the desire to learn and implement different ways of treatment for their patients and clients.

Integrative and functional medicine approaches, including comprehensive laboratory tests, can be utilized by a wide variety of practitioners from medical doctors, osteopaths, naturopaths and chiropractors to other health professionals such as clinical nutritionists and health coaches. The types of health disorders often helped with integrative medicine is extensive and includes a range of conditions from allergies, arthritis and autism to neurological and autoimmune disorders, chronic fatigue syndrome and more.

The Organic Acids Test is the cornerstone of any laboratory evaluation, and I personally consider it to be “the hub of the wheel” in evaluating for underlying problems.

What Is The Advanced OAT Mastery Course By Dr. Kurt N. Woeller?

The Advanced OAT Mastery Course is a comprehensive online course focusing on the expanded use of the Organic Acids Test. Each marker on the Great Plains Laboratory OAT test will be explained in detail, along with in-depth clinical correlation, lab reviews, case studies, OAT category correlation to other laboratory testing, e.g. mycotoxins, environmental chemicals, SIBO and a deeper understanding of commonly seen OAT markers. Whether you work with people dealing with autism, autoimmunity, chronic fatigue, digestive problems, mental health and/or neurological disorders, this course will provide the most extensive information on OAT assessment available.

Who Is This Course For?

The Advanced OAT Mastery Course is appropriate for any health practitioner who has some experience in using Organic Acids Testing regardless of which laboratory company has been used in the past. Also, health practitioners who are alumni of other "Mastery Courses" through Integrative Medicine Academy or have attended a Great Plains Laboratory *(GPL Academy)* seminar on the Organic Acids Test, will find Dr. Woeller's Advanced OAT Mastery Course challenging, but incredibly useful.

Do I Have To Have Some Other Type Of Functional Medicine Or Organic Acids Test Training Before I Can Participate?

No, but it is highly recommended. This is **NOT** a basic OAT course. For practitioners just getting started with the OAT in practice, please contact us directly for more information on an upcoming GPL Academy event (hosted by Great Plains Laboratory) or the Basic OAT (OAT 101) from Integrative Medicine Academy.

What Will I Be Able To Do Once I Have Completed The Advanced OAT Mastery Course?

This course will provide you with extensive information on Organic Acids Testing, clinical correlations, test marker interpretations, correlation to complementary lab tests (such as chemical, mold toxin and other functional medicine labs), as well as protocols and much more.

After this course, you will be well prepared for more in-depth course material linked to environmental toxicity *(chemicals, heavy metals, mold),* small intestine bacterial overgrowth *(SIBO),* methylation/folate cycle imbalances, etc.

Also, by the end of this course you will have advanced skills in being able to assess complicated patient health history's, their personal Great Plains Laboratory Organic Acids Test and even other OATs from other functional medicine laboratory companies.

In addition, practical information regarding various therapies, treatment protocols, troubleshooting cases and much more will be provided. As a health care practitioner, you will be able to take this information and apply it in your practice immediately.

The Advanced OAT Mastery Course Includes:

- 12 Modules (over 25 Hours)
- 12 Live Webinar Lessons
- Bonus Lectures
- 4 Live Q&A Sessions
- 24/7 Private Forum Access
- Downloadable Documents
- Certificate of Completion
- CME/CEU Credits

You'll Learn About:

- Each Marker on the Organic Acids Test *(from Great Plains Laboratory)*
- Common Markers Seen on "Other Lab" OATs
- In-depth Lab Test Interpretation & Clinical Correlation
- OAT Category Prioritization, Correlations & Treatment Options
- OAT, Methylation, Folate, Fatty Acid & other imbalances
- OAT & Toxicity, Mitochondrial & Various Metabolic Disorders
- Pathogen Assessment & Treatment, e.g. Candida, fungus
- Clostridia bacteria toxins & advanced information
- Fatty Acid & Amino Acid Metabolite Imbalances
- Case Reviews, Clinical Pearls & Troubleshooting
- Prioritizing & Treatment Plans

About Kurt N. Woeller, D.O.

Kurt N. Woeller, D.O., is a Doctor of Osteopathic Medicine, integrative and functional medicine physician and biomedical autism treatment specialist. He is the author of several integrative health books:

- ***Autism – The Road To Recovery***
- ***Methyl-B12 for Autism***
- ***7 Facts You Need To Know About Autism***
- ***Methyl-B12 and Methylation Therapy for Alzheimer's Disease and Dementia***
- ***5 Things You MUST Do To Treat Your Rheumatoid Arthritis (co-authored with Dr. Tracy Tranchitella).***

Dr. Woeller is an international lecturer and educator and provides health practitioner education through Integrative Medicine Academy, an online resource for educational information on integrative medicine topics. He also runs Autism Recovery System, an online resource for parents of autism-spectrum individuals.

Dr. Woeller is the course creator for many of the mastery courses offered through Integrative Medicine Academy, including Autism Mastery, Functional Medicine Mastery, SIBO Mastery and Toxicity Mastery. He also is the OAT seminar creator and presenter for Great Plains Laboratory's, GPL Academy conferences.

His private practice focuses on specialized diagnostic testing and treatments for individuals with complex medical conditions like Autism, Autoimmune and Neurologic disorders and other chronic health conditions.

Dr. Woeller serves as a clinical consultant for both BioHealth Laboratory and Great Plains Laboratory providing patient and physician education regarding functional and integrative medicine through one-on-one training and monthly webinars. He is on the Integrative Medicine for Mental Scientific Advisory Panel and is a member of the American Osteopathic Association.

Dr. Kurt N. Woeller can be reached for private consultations at SCMedicalCenter@gmail.com.

References:

(1) Leesa FC, Mu Y, Bamberg WM, et al. "Burden of Clostridium difficile infection in the United States." N Engl J Med. 2015;372:825-834.

(2) Shaw, W. "Increased urinary excretion of a 3-(3-hydroxyphenyl)-3-hydroxypropionic acid (HPHPA), an abnormal phenylalanine metabolite of Clostridia spp. in the gastrointestinal tract, in urine samples from patients with autism and schizophrenia." Nutr Neurosci. 2010. 13(3):135-43.

(3) Goodhart, PJ, et. al. "Mechanism-based inactivation of dopamine beta-hydroxylase by p-cresol and related alkylphenols." Biochemistry. 1983 Jun 21; 22(13):3091-6

(4) John D. Hunt. Associate Clinical Professor of Psychiatry, Vanderbilt University Medical School, Nashville, Tennessee; CEO & Medical Director, Center for Attention and Brain Function, Nashville, Tennessee "Functional Roles of Norepinephrine and Dopamine in ADHD: Dopamine in ADHD"Associate Clinical Professor of Psychiatry, Vanderbilt University Medical School, Nashville, Tennessee; CEO & Medical Director, Center for Attention and Brain Function, Nashville, Tennessee.