Understanding Autism

Traditionally, the diagnosis of autism has been based on the observation of behavior, and treatment focused primarily on alleviating challenging behaviors. However, there is a very real biomedical component to the disorder in which underlying medical issues often cause or contribute to autistic behavior. Some of the most common problems include gastrointestinal (GI) overgrowth of Candida and Clostridia, inability to detoxify environmental toxins, and development of food intolerances and/or allergies. These physical and environmental factors limit the nutrients available to the brain and body, resulting in damage to cellular, metabolic, and central nervous system functionality. Every individual with autism exhibits unique behavioral and cognitive symptoms with varying degrees of severity. Common symptoms can also include eczema, diarrhea, constipation, rashes, dark eye circles, and visible stomach pain.¹

Genetic susceptibility to autism may determine who develops this complex disorder, but nutrient deficiencies and food allergies strongly influence the severity of symptoms. Exposure to toxins (particularly metals) and imbalanced microbial growth in the GI tract contribute to pathological responses to food. Yeast (most commonly, Candida), parasites, viruses, and bacteria, particularly Clostridia, all have the potential to act as pathogens.

Eradicating harmful and often recurrent intestinal microbes and restoring proper intestinal flora balance is the best place to start so the body can begin to heal and detoxify itself. Eliminating IgG-reactive foods which can contribute to inflammation is an important part of healing the GI tract.

The following are peripheral issues seen in autism that are exacerbated by abnormal intestinal flora:

- Impaired detox pathways
- Reduction in glutathione levels
- Poor sleep quality
- Speech and behavioral issues
- Oxidative stress
- Immune dysfunction
- Deficient essential fatty acids

Personalized Testing and Treatment

Typical routine lab work often falls short of uncovering subtle abnormalities which can have a profound effect on health. Unless accurately addressed, this vicious cycle will continue to inhibit the various biochemical pathways necessary for proper neurological and immune function. The resulting complications contribute to, and may even cause, the symptoms of autism.

To achieve optimal results, it is critical that potential biomedical issues be assessed and included as part of the overall treatment programs for individuals with autism spectrum disorders.

Comprehensive laboratory testing can identify the physiological imbalances that contribute to autism and point to an individualized treatment approach. Treatments are designed to restore the body to balance and optimize function through nutritional support, diet, detoxification, and reduction of toxic environmental influences.
Recommended Tests for Autism Spectrum Disorders

**Organic Acids Test (OAT)**
Reducing or eliminating yeast overgrowth can be an effective method of reducing autistic symptoms. Microbial overgrowth can be measured by urine organic acid analyses of yeast and bacterial metabolites. The Organic Acids Test quantifies other useful markers of energy cycle and neurological function, as well as nutritional adequacy. The test is also designed to identify some rare genetic diseases and indirect indicators of methylation problems. When Candida grows out of balance, it can disrupt areas of the intestinal wall, producing toxins and leading to leaky gut syndrome. Candida toxins can depress the immune system. An inflammatory immune response and multiple food sensitivities can result from the leaky gut. Many children on the autism spectrum have an overgrowth of certain Clostridia species, which produces a compound called HPHPA (3-(3-hydroxyphenyl)-3-hydroxypropionic acid). HPHPA may disrupt dopamine metabolism by interfering with the enzyme dopamine beta-hydroxylase. HPHPA is a potent toxin with profound neurological effects in autism, and can lead to moodiness, tantrums, extreme anxiety, aggression, and/or self-injurious behavior.

**GPL-TOX (Toxic Non-Metal Chemical Profile)**
A large number of studies have linked autism to increased exposure to a wide range of environmental chemicals or a decreased ability to detoxify toxic chemicals. Because exposure to environmental pollutants has been linked to many chronic diseases, including autism, we have created GPL-TOX, a toxic non-metal chemical profile that screens for the presence of 172 different toxic chemicals including organophosphate pesticides, phthalates, benzene, xylene, vinyl chloride, pyrethroid insecticides, acrylamide, perchlorate, diphenyl phosphate, ethylene oxide, acrylonitrile, and more. This profile also includes Tiglylglycine (TG), a marker for mitochondrial disorders resulting from mutations of mitochondrial DNA. These mutations can be caused by exposure to toxic chemicals, infections, inflammation, and nutritional deficiencies.

**GPL-MycoTOX Profile**
Mycotoxins released from mold fungi are some of the most prevalent toxins in the environment. A majority of mycotoxin exposures are through food ingestion or airborne exposure from water-damaged buildings and homes. Unfortunately, mycotoxins are resistant to heat and many processing procedures. Diseases and symptoms linked to mycotoxin exposure include fever, pneumonia-like symptoms, heart disease, rheumatic disease, asthma, sinusitis, cancer, memory loss, vision loss, chronic fatigue, skin rashes, depression, ADHD, anxiety, and liver damage. Studies are now coming out correlating the severity of symptoms from mycotoxin exposure with autism, perhaps due to common decreased detoxification abilities for those with autism. With our new GPL-MycoTOX Profile, we can identify exposures to seven common mycotoxins and make recommendations for detoxification treatments that have been effective.

**Metals Tests (Hair, Fecal, Whole Blood)**
Symptoms of autism are consistent with those of a mercury toxicity. Metal toxicity impacts cognition, language, immunity, and behavior. Identifying and eliminating metals such as lead, arsenic, aluminum, and mercury is an important step toward recovery. Evidence shows that children with autism tend to have low levels of glutathione and cysteine, which are critical to the removal of toxic metals like mercury. Children with autism are also frequently treated excessively with oral antibiotics, which greatly inhibits excretion of mercury.

**IgG Food Allergy Test + Candida**
Most of the time, food reactions are IgG-mediated. These sensitivities tend to create problems because they stress the child’s immune system, compromising digestion and resulting in inflammation and increased behavioral issues. IgG food allergy testing can identify the specific antibody reactions not commonly tested by allergists. Eliminating offending foods strengthens the immune system and may help significantly reduce autistic symptoms and GI problems. The use of probiotics may also be beneficial in alleviating GI dysfunction, inflammation, and potential behavioral symptoms shown by some children on the autism spectrum.
Glyphosate Test

Glyphosate is the world’s most widely produced herbicide. High correlations exist between glyphosate usage and numerous chronic illnesses, including autism. Several researchers have proposed that it may be a cause of autism, based on epidemiological data that correlates increased usage of glyphosate with an increased autism rate.\(^6\) \(^8\)

Ingestion of foods exposed to glyphosate can lead to elevated glyphosate in the gastrointestinal tract, which in turn leads to an alteration of the intestinal microbial flora in which harmful species such as Clostridia replace beneficial microorganisms. In people with autism, a number of studies \(^9\) \(^10\) have indicated increased colonization of the intestinal tract with a variety of Clostridia species.\(^9\) The presence of increased Clostridia bacteria results in the increased production of Clostridia metabolites, such as HPHPA (5-7 from triplet article) and 4-cresol.\(^11\) Those compounds inhibit the conversion of dopamine to norepinephrine in the brain and in the sympathetic nervous system.\(^12\) \(^13\) Excessive amounts of the dopamine metabolite homovanillic acid have been found to be prevalent in urine samples from children with autism.\(^14\) \(^15\) Metabolites of dopamine induce mitochondrial dysfunction, oxidative stress, the formation of neurotoxic α-synuclein protofibrils, and impaired protein degradation. The Glyphosate Test is a urine test that can be easily added on to other urine tests like the Organic Acids Test or GPL-TOX.
Recommended Tests for Autism Spectrum Disorders

Gluten / Casein Peptides
About 60% of children with autism have shown adverse reactions to proteins found in wheat (gluten) and dairy (casein) products. The Peptides Test measures small protein fragments called neuro-peptides that bind to opiate receptors in the brain. These opiate peptides are partially digested proteins that have the potential to interfere with neurotransmission, resulting in cognitive difficulty and speech impairment. Worsening neurological symptoms have been reported in autistic patients after consumption of milk and wheat. In one study, the behavioral symptoms of most patients greatly improved after a period of 8 weeks on an elimination diet.

Advanced Cholesterol Profile
Cholesterol is essential to brain development, and is one of the healthy fats required for myelination of the brain and for the health and repair of cell membranes. Cholesterol supports adrenal pathways and sex hormone production, and is also critically important in improving the efficiency of oxytocin receptors in the brain. The majority of kids on the spectrum have a problem with oxytocin function, which can result in problems with socialization and cause symptoms of anxiety. Identifying and treating low cholesterol levels with cholesterol supplementation can significantly improve the symptoms of autism.

Comprehensive Stool Analysis
Comprehensive stool analysis detects the presence of pathogenic yeast, parasites, and bacteria that could be contributing to chronic illness and neurological dysfunction. The test evaluates overall intestinal function and beneficial bacterial levels, and indicates which agents will be most effective in killing harmful bacteria and yeast.

Copper + Zinc Profile
The Copper/Zinc Profile is an excellent way to determine immune status and the nutritional intake and/or absorption of zinc and copper. Zinc is necessary for the proper functioning of the immune system. This essential trace element is required for the activity of over 300 enzymes and is involved in most major metabolic pathways. The immune system depends on zinc in almost every aspect. Zinc deficiency may be common in children with autism who have had diarrhea for extended time periods and could contribute to their poor appetites. Zinc has an inverse relationship with copper in the body. This means that as zinc goes down, copper goes up and vice versa. Adequate copper levels are essential for the growth of new blood vessels, wound healing, and recovering from heart attacks and strokes. When levels are only slightly above normal physiological amounts, copper can be toxic. Any mild abnormality or impairment of liver function can lead to copper excess.

Streptococcus Antibodies Profile
This profile screens for the two most common antibodies against streptococcus, DNase antibodies in serum (ADB); antistreptolysin O titer (ASO). These antibodies may cross-react with brain tissue causing abnormal behaviors. Both of these tests are performed to identify a previous infection of group A beta-hemolytic Streptococcus. These infections cause rheumatic fever or a kidney disease called glomerulonephritis, poststreptococcal versions of these diseases, as well as scarlet fever. Recently, high titers of these antibodies have been associated with PANDAS (Pediatric Autoimmune Neuropsychiatric Disorder Associated with Streptococcal Infections) and with autism, Tourette syndrome, tic disorder, Parkinson's disease, and OCD.
The Need for Comprehensive Testing in Autism Spectrum Disorder

By Kurt N. Woeller, D.O.
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The complex health challenges of many children with autism spectrum disorder (ASD) cannot be overstated. Commonly, these children are dealing with multiple medical problems including chronic allergy, digestive problems, food intolerances, nutritional deficiencies, heavy metal toxicity and detoxification issues, immune disorders, and more. All of these create a significant problem, particularly when attempting to implement a comprehensive treatment program through dietary intervention, nutritional support, detoxification therapies, and traditional medications.

Much can be assumed when it comes to biomedical intervention for autism – such as a particular child may be suffering with all or some of the above listed items just based on clinical history and examination. However, clinical assumption will only take you so far in your decision-making and the concrete information becomes imperative. I believe comprehensive testing is necessary for most ASD children. Even the seemingly easy cases of autism can be very complex from a biomedical standpoint, and when testing is not complete, early indicators of underlying health problems can be easily missed.

The information you gather today could save weeks or even months of therapeutic inactivity for a particular child who otherwise could have benefited from medical treatments. Below are some of the reasons I recommend comprehensive testing to gain a more complete understanding of the complex health challenges facing children with ASD.

- Children with ASD rarely receive laboratory testing beyond what would be considered the basics, such as Fragile X and standard blood work. Many times, despite the fact that a child is obviously dealing with chronic allergies, digestive issues, etc., no testing is initiated by their regular physicians. All of these children need and deserve a thorough lab work-up.
- The more testing you can do up front for a child the quicker both basic (supplements, anti-fungal medication) and advanced therapy (detoxification, immune support) can be initiated.
- Precious time can be lost if testing is done “piece meal.” Although not every parent or patient can afford up-front comprehensive testing all at once – if you do not offer it, you will never know. I never try to interpret what a patient can and cannot afford. I offer them what I believe is critical to evaluate their child and let them determine if they can afford the testing. Doing anything less is a disservice to them and their child.
- Parents (or patients) will often not be easily convinced to start dietary or therapeutic intervention until they see a positive test result. An example of this is the gluten and casein-free diet. You can tell the parents all day long that it is necessary to implement the diet for their child, but until they see a test result on paper, they will not be moved to activity.
- Many times comprehensive testing can help rule out what is not wrong with a particular child. This is invaluable information since much time can be wasted chasing things that do not exist.
- I have also experienced over the years that tremendous time can be wasted if enough information is not ascertained in the very beginning. It is time that could be spent on treatment. Remember, for many of these kids, time is of the essence.
- Finally, in my many years in practice, I have seen money lost because parents waited to do comprehensive testing on their child(ren). This happens because therapies are initiated before/without testing that do not work, or are less effective because of other mitigating issues that could be found with testing. For example, implementing heavy metal detoxification therapy in a child that has not fully addressed digestive imbalances of yeast and bacteria will be less effective than it could be. Another example is implementing anti-fungal therapy for many months in a child who has chronic food intolerances that have not yet been addressed, when those intolerances contribute to the chronic yeast problem.
The Need for Comprehensive Testing

Many parents/patients think that comprehensive testing is going to be their biggest expense when it comes to biomedical intervention, when in fact it is the therapies such as medications, supplements, and dietary changes that generate most of the expense. Even consultations with the doctor are just a small fraction of what many parents will spend on treating their child.

My recommendation is to get as much information as you can upfront so that each family can prioritize their financial resources for treatment for their child. While progressing through treatment with a particular child, other tests may be needed, but most of the time this does not include large test panels. Instead, a few tests here and there to recheck blood mineral levels or the status of yeast treatment may be necessary.

Most parents who are seeking answers to their ASD child’s health problems have been told for months or years by the traditional medical community that nothing can be done to help their child. The door has been slammed shut because these doctors do not know what to do. Parents are looking for answers and know intuitively that certain therapies could be helpful, but they need guidance in getting it done. Never run a test purely for information gathering, but only with the clear intent that it will shape your therapeutic approach. This is what parents are seeking – options for intervention, and the means to help their kids improve emotionally, mentally, and physically.

The below figures show the rate of three specific health conditions common in children with autism compared to the rate in non-autistic children. All three of these conditions are specifically assessed in our Organic Acids Test (OAT).
Further Reading by William Shaw, Ph.D., Director of The Great Plains Laboratory, Inc.

- Biological Treatments for Autism and PDD (book)
- Autism: Beyond the Basics (book)
- The Yeast Problem & Bacteria By Products (article)
- Oxalates Control is a Major New Factor in Autism Therapy (article)
- Increased Urinary Excretion of Analogs of Krebs Cycle Metabolites and Arabinose in Two Brothers with Autistic Features (article)
- Assessment of Antifungal Drug Therapy in Autism by Measurement of Suspected Microbial Metabolites in Urine with Gas Chromatography - Mass Spectrometry (article)
- Porphyrin Testing and Heavy Metal Toxicity: Unresolved Questions and Concerns (article)
- Deficient Cholesterol: A Common New Factor in Autism (article)
- Lithium Deficiency: Common in Mental Illness and Social Ills (article)
- 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. (Published in the Journal of Nutritional Neuroscience)
- The Importance of Testing for Glyphosate – The World’s Most Widely Used Herbicide (with Matthew Pratt-Hyatt, Ph.D., Associate Laboratory Director, published in the January 2017 issue of Townsend Letter)
- Elevated Urinary Glyphosate and Clostridia Metabolites With Altered Dopamine Metabolism in Triplets With Autistic Spectrum Disorder or Suspected Seizure Disorder: A Case Study (published in the January 2017 issue of Integrative Medicine Clinicians Journal)
- Is the Weedkiller Glyphosate Harming Your Health? (published in the September 2017 issue of Autism Parenting Magazine)

Available at www.greatplainslaboratory.com.

The Great Plains Laboratory, Inc.
The Great Plains Laboratory, Inc. is a research-based clinical laboratory offering testing for nutritional factors in chronic illnesses such as autism, AD(H)D, fibromyalgia, and gastrointestinal and neuropsychiatric disorders. We provide a variety of metabolic tests including those for immune deficiency, amino acids, essential fatty acids, glutathione levels, inflammation, metal toxicity, toxic chemicals, and food allergies. We are dedicated to assisting healthcare practitioners make a difference by helping children, adults, and families achieve their maximum potential through quality laboratory testing. Our laboratory provides the most reliable, comprehensive, and understandable scientific results, using the latest technology and proven techniques.
References