

April 4, 2023

**Introduction to Functional & Integrative Medicine for ADHD
and Lab Testing**

This introductory session of the ADHD Intensive will begin with an objective evaluation of mainstream ADHD treatment models, which rely heavily upon the use of pharmaceuticals as a means to suppress or manage symptoms. The limitations of this model, which accounts neither for biologic etiology nor the biochemical individuality of each ADHD patient, will be objectively reviewed in light of overwhelming evidence that ADHD is, in fact, a neurobiologic condition.

The myriad neurobiologic abnormalities associated with ADHD invite a functional medicine approach, and this session is dedicated to elucidating this approach – which is the conceptual and practical basis for Dr. Greenblatt's proven *Plus/Minus Plan* for the treatment of ADHD. Research and clinical evidence will coalesce an empirically validated rationale for the implementation of a functional approach, one inclusive of comprehensive physical assessment and objective laboratory testing.

Laboratory Testing - Laboratory testing can illuminate critical therapeutic targets for today's functional clinicians, and open the door to the tailoring of medical interventions to the unique needs of individual patients. Accordingly, part of this introductory session will be dedicated to testing - bridging concept and application in clinical practice.

Topics of discussion will include:

- Incorporating lab testing into modern intake/assessment paradigms
- Types of functional testing: blood/serum, hair analysis, genetic testing, urinalysis
- Navigating health insurance and patient finances
- How to order special tests, e.g. Organic Acids Testing, trace mineral hair analysis, etc.
- Treating the patient, not the test results

Objective laboratory testing is a keystone of the functional medicine model, and permits clinicians to address the biology underlying ADHD...thus maximizing therapeutic potentials and patient outcomes.

April 18, 2023

Low-Dose Nutritional Lithium

Low-Dose Nutritional Lithium – The role of the natural and essential mineral lithium in supporting neurologic health is often overlooked, as is the psychiatric implications of functional lithium deficiency. Dr. Greenblatt will explore the therapeutic potentials of microdose lithium in the treatment of ADHD, elucidating the lithium dose-response curve, highlighting clinical indicators of lithium deficiency, exploring the mechanisms through which lithium can benefit the ADHD patient, and providing evidence based clinical guidelines for dosing and titration.

April 25, 2023

Magnesium, Zinc, and Copper

Research has firmly established ADHD as disorder represented by numerous biologic abnormalities which together impact brain function and give rise to behavioral alterations. Of the many biochemical abnormalities associated with ADHD pathogenesis, deficiencies and/or imbalances in essential minerals are among the most significant.

This session will focus on three minerals –magnesium, copper, and zinc – and the mechanisms through which deficiencies and/or imbalances in levels of each mineral may contribute to attentional dysfunction. Research linking imbalances in these minerals with ADHD presentation and symptom severity will be presented, underscoring the significance of each one as a functional biomarker and therapeutic target. Recommendations for testing and lab results analysis will be elucidated, along with strategies for micronutrient repletion as part of a functional therapeutic approach.

Magnesium – a truly essential mineral present in all living organisms, magnesium is often overlooked in psychiatric assessment...despite the established fact that deficiencies are very common amongst ADHD patients. The myriad physiologic and biochemical functions of magnesium will be discussed, as will studies supporting associations between magnesium deficiency, ADHD symptom severity, and ADHD treatment-resistance. Clinical indicators of deficiency will be explored, as will recommendations for dosing such that patients realize optimal therapeutic benefit from supplementation.

Zinc & Copper – Zinc and copper are essential nutrients which play important roles in physiologic and neurologic health. What many health professionals overlook, however, is the antagonistic relationship these minerals share: high copper depletes zinc, and high zinc depletes copper. When it comes to ADHD, the zinc:copper ratio assumes extreme clinical relevance, underscored by research demonstrating increased irritability and aggression in patients with high copper levels. In fact, a zinc:copper imbalance is among the more common biochemical abnormalities identified in ADHD patients, making both minerals critical treatment targets. This session will explore zinc:copper antagonism, and the neuropsychiatric sequelae of functional imbalance. Evidence-based recommendations and clinical pearls for testing, repletion, and rebalancing will be provided.

May 2, 2023

Amino Acids, Digestion, and Medications

The keystone of mainstream psychiatry's psychopharmacology model is one of neurotransmitter modulation: influencing the release, reuptake, and/or degradation of the nervous system's chemical messengers, thereby affecting brain function and, distally, mood and behavior. Traditionally accomplished through psychotropic medications, neurotransmitter modulation can also be achieved via functional interventions targeting neurotransmitter synthesis and/or the absorption of precursor and cofactor molecules made available to the body by digestion.

This session will explore evidence-based interventions that target neurotransmitter pathways, as well as digestive processes that heavily influence the availability of precursor and cofactor molecules essential to neurotransmitter synthesis. The goal of this supervision is to present a balanced clinical approach for today's provider, whereby interventions best suited to a patient's unique symptomatic constellation and biochemistry can be tailored for optimal therapeutic results.

Amino Acids – the building blocks of neurotransmitters and enzymes, amino acids are critical components of neurotransmission pathways. Deficits of amino acids, accordingly, can adversely impact neurotransmitter availability, leading to alterations in mood, cognition, and behavior. Dr. Greenblatt will discuss factors contributing to amino acid deficiencies and how they correlate with ADHD presentations. Strategies for amino acids supplementation for neurotransmitter support will also be reviewed, as well as recommendations for lab testing.

Functional Digestion – the myriad processes whereby nutrients stored in food are made available for use by the body – together, digestion – are often overlooked in mainstream psychiatric models, despite the direct influence they have on neurotransmitter activity and brain health. Impairment of the digestive cascade can lead to insufficient absorption of essential nutrients from which neurotransmitters and enzymes are synthesized, ultimately contributing to deficiency states and/or neurotransmitter imbalance. Here Dr. Greenblatt will discuss some of the more common factors influencing digestive efficacy – including gastric acid and zinc status – as well as functional strategies for optimizing digestion to support neurotransmission.

Medications – customarily used to effect neurotransmitter modulation in the management of ADHD, pharmaceuticals such as stimulants and antidepressants remain go-to treatments for most patients today. Many medications, however, come with an array of side-effects, and are often prescribed according to a model that is entirely devoid of etiology or biochemical individuality. In this session Dr. Greenblatt will objectively review mainstream psychopharm approaches to ADHD, appraising the relative risks and benefits of medications as well as appropriate contexts for medication use in conjunction with a functional medicine model.

May 23, 2023

Dysbiosis (*Candida*, *Clostridia*), Probiotics, & Phytochemicals (OPCs, *Rhodiola*)

In this session, Dr. Greenblatt will explore gut microbial imbalance and its connection to ADHD symptomatology as well as plant-based compounds of demonstrated efficacy as adjunctive ADHD interventions.

Dysbiosis and the Gut-Brain Axis – research has confirmed that the health and balance of our gut microbiota (the totality of commensal microbes occupying the digestive tract) is important not only for the maintenance of optimal physical health but also for neurologic health. Gut microbial imbalance (dysbiosis) can adversely impact mood and behavior, and an overgrowth of pathogenic species can cause an accumulation of neurotoxic metabolites that leads to increased agitation, irritability, and dysphoria.

This session will focus on the gut microbiota as a therapeutic target, exploring the science of the gut-brain axis and highlighting mechanisms through which gut microbiota influence brain function. The proximal and distal sequelae of pathogenic microbial overgrowth – specifically, *Candida* yeast and *Clostridia* bacteria – will be examined in detail. Clinically proven protocols for the mitigation of *Candida* and *Clostridia* overgrowth will be presented, as will recommendations for the use of probiotics in supporting ADHD treatment.

OPCs & Rhodiola - The plant-derived bioflavonoid complexes known as oligomeric proanthocyanidins (OPCs) and the adaptogenic plant *Rhodiola rosea* have histories of medicinal use that span millennia, and both have recently reclaimed the attentions of the functional psychiatry community as being of significant therapeutic benefit for ADHD. OPCs have been shown to exert powerful antioxidant activity, to support the health of the blood-brain barrier, and to balance brain waves for the promotion of focus and calm. *Rhodiola*, as an adaptogen, optimizes the body's homeostatic systems and modulates the endogenous stress response to support balanced mood.

In this session attendees will explore the fascinating science underlying OPCs' and *Rhodiola*'s demonstrated benefits as components of a functional medicine approach for ADHD. The biochemical mechanisms through which these plant compounds influence brain oscillations, neurotransmitter modulation, and mineral status will be reviewed, as will research supporting the use of OPCs and *Rhodiola* for ADHD treatment. Evidence-based recommendations for dosing and titration will also be presented.

June 27, 2023

Final Case Discussions and Open Q&A

This session will provide attendees with a final opportunity to present and discuss submitted cases, the latter half of which will be dedicated to open Q&A with Dr. Greenblatt. Please come to this session prepared with any questions you may like to ask during the Q&A forum.

Recommended Readings by Session Topic/Date

April 4: Introduction to Functional & Integrative Medicine for ADHD & Lab Testing

- Hoffer A. History of orthomolecular medicine. *J Orthomol Psych.* 1974;3:223.
- Pauling L. Orthomolecular psychiatry. *Science.* 1968;160:265.
- Williams RJ, Heffley JD, Yew ML, Bode CW. A renaissance of nutritional science is imminent. *Perspect Biol Med.* 1973 Autumn;17(1):1-15.
- Greenblatt J. Psychiatry redefined – the evolution of psychiatry. From the measureless medicine to precision healing. *Townsend Letter.* Psychiatry Redefined – The Evolution of Psychiatry: From the Measureless Medicine to Precision Healing - Townsend Letter. Published 2019.
- Greenblatt J. Dietary influences on behavioral problems in children. *The Great Plains Laboratory, Inc.* DIETARY INFLUENCES ON BEHAVIORAL PROBLEMS IN CHILDREN — The Great Plains Laboratory, Inc. Published June 7, 2017.
- Schofield L. Testing technology update. *Natural Practitioner.* Testing Technology Update (naturalpractitionermag.com) Published November 1, 2018.

April 18: Low-Dose Nutritional Lithium

- Greenblatt J. The role of heavy metals and environmental toxins in psychiatric disorders. *The Great Plains Laboratory, Inc. The Role of Heavy Metals and Environmental Toxins in Psychiatric Disorders — The Great Plains Laboratory, Inc.* Published July 10, 2017.
- Szklarska D, Rzymiski P. Is Lithium a Micronutrient? From Biological Activity and Epidemiological Observation to Food Fortification. *Biol Trace Elem Res.* 2019;189(1):18-27.
- Deepmala, Coffey B. Challenges in psychopharmacological management of a young child with multiple comorbid disorders, history of trauma, and early-onset mood disorder: the role of lithium. *J Child Adolesc Psychopharmacol.* 2014;24(9):519-524.
- Dorrego MF, Canevaro L, Kuzis G, Sabe L, Starkstein SE. A randomized, double-blind, crossover study of methylphenidate and lithium in adults with attention-deficit/hyperactivity disorder: preliminary findings. *J Neuropsychiatry Clin Neurosci.* 2002;14(3):289-295.

April 25: Magnesium, Zinc:Copper

- Ghanizadeh A. A systematic review of magnesium therapy for treating attention deficit hyperactivity disorder. *Arch Iran Med.* 2013;16(7):412-417.
- El Baza F, AlShahawi HA, Zahra S, Abdel-Hakim RA. Magnesium supplementation in children with attention deficit hyperactivity disorder. *Egypt J Med Hum Genet.* 2016;17(1):63-70.
- Greenblatt JM. Mineral imbalances and ADHD: Part II. Magnesium Deficiency. *Psychiatry Redefined.*
<https://www.psychiatryredefined.org/finally-focused-mineral-imbalances-adhd-part-ii/>.
- Viktorinova A, Ursinyova M, Trebaticka J, Uhnakova I, Durackova Z, Masanova V. Changed Plasma Levels of Zinc and Copper to Zinc Ratio and Their Possible Associations with Parent- and Teacher-Rated Symptoms in Children with Attention-Deficit Hyperactivity Disorder. *Biol Trace Elem Res.* 2016;169(1):1-7.
- Lepping P, Huber M. Role of zinc in the pathogenesis of attention-deficit hyperactivity disorder: implications for research and treatment. *CNS Drugs.* 2010;24(9):721-728.
- Kicinski M, Vrijens J, Vermier G, et al. Neurobehavioral function and low-level metal exposure in adolescents. *Int J Hyg Environ Health.* 2015;218(1):139-146.

May 2: Amino Acids, Digestion, & Medications

- Biskup CS, Helmbold K, Baurmann D, et al. Resting state default mode network connectivity in children and adolescents with ADHD after acute tryptophan depletion. *Acta Psychiatr Scand.* 2016;134(2):161-171.
- Hinz M, Stein A, Neff R, Weinberg R, Uncini T. Treatment of attention deficit hyperactivity disorder with monoamine amino acid precursors and organic cation transporter assay interpretation. *Neuropsychiatr Dis Treat.* 2011;7:31-38.

- Harstad EB, Weaver AL, Katusic SK, et al. ADHD, stimulant treatment, and growth: a longitudinal study. *Pediatrics*. 2014;134(4):e935-e944. doi:10.1542/peds.2014-0428
- Howard JT, Walick KS, Rivera JC. Preliminary Evidence of an Association Between ADHD Medications and Diminished Bone Health in Children and Adolescents. *J Pediatr Orthop*. 2017;37(5):348-354.

May 23: Dysbiosis (Clostridia, Candida), Probiotics, & Phytochemicals (OPCs, Rhodiola)

- Sandgren AM, Brummer RJM. ADHD-originating in the gut? The emergence of a new explanatory model. *Med Hypotheses*. 2018 Nov;120:135-145. doi: 10.1016/j.mehy.2018.08.022.
- Dicks LMT, Mikkelsen LS, Brandsborg E, Marcotte H. Clostridium difficile, the Difficult "Kloster" Fuelled by Antibiotics. *Curr Microbiol*. 2019;76(6):774-782.
- Liang S, Wu X, Jin F. Gut-Brain Psychology: Rethinking Psychology From the Microbiota-Gut-Brain Axis. *Front Integr Neurosci*. 2018;12:33.
- Shaw W. Inhibition of dopamine conversion to norepinephrine by Clostridia metabolites appears to be a (the) major cause of autism, schizophrenia, and other neuropsychiatric disorders. The Great Plains Laboratory, Inc. <https://www.greatplainslaboratory.com/>.
- Wang LJ, Yang CY, Chou WJ, et al. Gut microbiota and dietary patterns in children with attention deficit/hyperactivity disorder. *Eur Child Adolesc Psychiatry*. 2020;29(3):287-297.
- Fintelmann V, Gruenwald J. Efficacy and tolerability of a Rhodiola rosea extract in adults with physical and cognitive deficiencies. *Adv Ther*. 2007;24(4):929-939.
- Greenblatt JM, Dimino JC, To W. Oligomeric proanthocyanidins (OPCs) for the treatment of Attention Deficit/Hyperactivity Disorder. *Neuropsychotherapist*. 2017 May;5(5):24-42.