

3/11/21: Introduction to Functional and Integrative Medicine for ADHD + Recommended Lab Testing

This introductory session of the ADHD Intensive will begin with an evaluation of ADHD treatment models, which rely heavily upon the use of pharmaceuticals as a means to manage symptoms. The limitations of this model, which accounts neither for biologic etiology nor the biochemical individuality of each ADHD patient, will be reviewed.

The myriad neurobiologic abnormalities associated with ADHD invite a functional medicine approach, and this session is dedicated to describing this approach. Research and clinical evidence will coalesce an empirically validated rationale for the implementation of a functional approach, one inclusive of comprehensive psychiatric assessment and objective 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.

Topics of discussion will include:

- Incorporating lab testing into modern intake/assessment paradigms
- Types of functional testing: blood/serum, hair analysis, genetic testing, urinalysis
- Treating patients, not laboratory tests

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.

3/25/21: Lithium, 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 are deficiencies and/or imbalances in essential minerals.

This session will focus on four minerals – lithium, magnesium, copper, and zinc – and the mechanisms through which deficiencies and/or imbalances in levels of each mineral may contribute to attentional dysfunction.

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. We 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.

Magnesium – Magnesium deficiencies are common with ADHD patients. The myriad physiologic and biochemical functions of magnesium will be discussed, ADHD symptom severity, and ADHD

treatment-resistance. Clinical indicators of deficiency will be explored, as will recommendations for dosing.

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.

4/4/21: 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.

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. Strategies for amino acids supplementation for neurotransmitter support will also be reviewed, as well as recommendations for lab testing.

Digestion and Absorption – the myriad processes whereby nutrients stored in food are made available for absorption and 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.

Medications – In this session we 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. Nutritional supplementation to reduce medication side effects will be discussed.

4/22/21: Dysbiosis (Candida, Clostridia, Probiotics), & Phytochemicals (OPCs, Rhodiola)

In this session, we 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 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.

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.

5/21/21: Final Case Discussions and Open Q&A

This session will provide attendees with a final opportunity to present and discuss cases. Please try to submit cases at least one week prior to group supervision.

RECOMMENDED READINGS, BY SESSION TOPIC

3/11/21: Intro to Functional & Integrative Medicine for ADHD + Recommended 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.

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.

3/25/21: Lithium, Magnesium, Zinc, and Copper

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.

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.

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.

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: magnesium deficiency. *Psychiatry Redefined*. [Finally Focused: Mineral Imbalances & ADHD Part II - Psychiatry Redefined](#).

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.

4/4/21: 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.

4/22/21: Dysbiosis (Clostridia, Candida) & 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.