

Title: Mind the Bugs: The Hidden Microbial Symphony of ADHD

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Abstract:

The gut-brain axis has emerged as a critical area of investigation in understanding neurodevelopmental disorders such as Attention-Deficit/Hyperactivity Disorder (ADHD). This presentation will delve into the intricate relationship between the microbiome, gut barrier function, and the metabolic profile in individuals with ADHD, highlighting findings from my research and ongoing studies.

Recent studies, including my work published in *Brain, Behavior, & Immunity - Health*, have demonstrated that ADHD patients exhibit significant dysbiosis, or imbalance in the gut microbiome, and reduced levels of short-chain fatty acids (SCFAs) compared to healthy controls. This imbalance is characterized by decreased microbial diversity and altered abundance of key bacterial groups, such as Lachnospiraceae and Ruminococcaceae, which are critical for SCFA production. SCFAs play a vital role in maintaining gut health and integrity, influencing both local and systemic inflammation, and have been implicated in various neurodevelopmental processes.



In addition to SCFA deficiencies, our research has identified increased intestinal permeability, often referred to as "leaky gut," in ADHD subjects. Elevated levels of fecal zonulin, a biomarker for gut barrier dysfunction, have been consistently observed, suggesting a compromised intestinal barrier in these individuals. This increased permeability allows harmful substances from the gut to enter the bloodstream, potentially causing inflammation that can affect brain function.

Building on these findings, my ongoing research explores the role of other microbial metabolites, including aromatic molecules derived from the shikimate pathway. Preliminary data indicate a lower relative prevalence of these metabolites in ADHD subjects, which could further elucidate the gut-brain communication pathways affected in this disorder. These molecules may serve as precursors for amino acids like phenylalanine and tryptophan which, in turn, are precursors for neurotransmitters such as serotonin, dopamine, and norepinephrine, which are crucial in neurodevelopmental processes.

This work aligns with broader investigations within our research group, which have observed similar gut microbiota alterations in conditions like depression and sleep disorders, reinforcing the concept of a shared microbiome-mediated mechanism underlying various mental health issues.

This presentation will integrate these findings, providing a comprehensive overview of how gut microbiota composition, SCFA production, and intestinal permeability are interlinked with ADHD pathophysiology. Attendees will gain insights into potential biomarkers for diagnosis and targets for therapeutic intervention, emphasizing the importance of a holistic approach to treating neurodevelopmental disorders through gut microbiome modulation.



Biography:

Dr. Rafi Steckler is an Israeli renowned expert in the fields of nutrition and biotechnology, with a distinguished career in medical sciences and a particular focus on the gut-brain axis and its implications for mental health. He holds a PhD in Medical Sciences from Poznan University of Medical Sciences, Poland.

Dr. Steckler currently serves as a Researcher and Lecturer in Nutritional Science and as the Head of the Physical Chemistry Lab and Chemical Analyst in the Research Department at Tel Hai Academic College, Israel. He is also a Senior Registered Dietitian at Clalit Health Services, a leading Israeli HMO organization, specializing in nephrology nutrition.

With over a decade of research experience, Dr. Steckler has made significant contributions to multiple fields, including the underlying mechanisms of the microbiota-gut-brain axis (MGBA) and its impact on ADHD and various neurodevelopmental disorders. His recent research on dysbiosis and decreased short-chain fatty acids in ADHD has been published in *Brain, Behavior, & Immunity - Health*.

In addition to his research and clinical work, Dr. Steckler has presented at numerous international conferences, including the 9th World Congress on ADHD in Amsterdam. His experience in conferences showcases his commitment to advancing knowledge and sharing practical insights with the mental health community.

Dr. Steckler's dedication to advancing understanding in the intersection of nutrition, biotechnology, and mental health makes him a pivotal figure in the field. Attendees of the International Conference on Psychiatry and Mental Health will benefit from his expertise and innovative perspectives on the role of gut health in psychiatric disorders.