DRAFT

Microbiome and Cognitive Disorders

General

Int J Neuropsychopharmacol.

Making Sense of … the Microbiome in Psychiatry (2019)

Abstract

Microorganisms can be found almost anywhere, including in and on the human body.

The collection of microorganisms associated with a certain location is called a microbiota, with its collective genetic material referred to as the microbiome.

The largest population of microorganisms on the human body resides in the gastrointestinal tract; thus, it is not surprising that the most investigated human microbiome is the human gut microbiome.

On average, the gut hosts microbes from more than 60 genera and contains more cells than the human body.

The human gut microbiome has been shown to influence many aspects of host health, including more recently the brain.

Several modes of interaction between the gut and the brain have been discovered, including via the synthesis of metabolites and neurotransmitters, activation of the vagus nerve, and activation of the immune system.

A growing body of work is implicating the microbiome in a variety of psychological processes and neuropsychiatric disorders.

These include mood and anxiety disorders, neurodevelopmental disorders such as autism spectrum disorder and schizophrenia, and even neurodegenerative disorders such as Alzheimer's and Parkinson's diseases.

Moreover, it is probable that most psychotropic medications have an impact on the microbiome.

Here, an overview will be provided for the bidirectional role of the microbiome in brain health, age-associated cognitive decline, and neurological and psychiatric disorders.

Furthermore, a primer on the common microbiological and bioinformatics techniques used to interrogate the microbiome will be provided.

This review is meant to equip the reader with a primer to this exciting research area that is permeating all areas of biological psychiatry research.

ADHD

Childhood Development and the Microbiome-The Intestinal Microbiota in Maintenance of Health and Development of Disease During Childhood Development. (2020)

We review the development of the gut microbiome, proponents of dysbiosis, and interactions of the microbiota with other organs. ...Dysbiosis has been associated with diseases in children and adults, including autism, attention deficit hyperactivity …

Autism

Nord J Psychiatry

Urinary organic acids spectra in children with altered gut microbiota composition and autistic spectrum disorder (2022)

Affiliations

Abstract

Introduction: Alteration of human gut microbiota is described in a number of neuro-developmental and cognitive disorders including autistic spectrum disorder (ASD). Along with the changes in the gut microbiota, children with ASD are also reported to have changes in urinary organic acid spectra implying these metabolites as potential biomarkers for gastrointestinal dysbiosis.

Aim: Identify urinary metabolites that would indicate specific changes in the gut microbiota and could be useful as biomarkers.

Methods: The study group consisted of 44 children with ASD. Urinary organic acids spectra and composition of gut microbiota were analysed.

Results: Any significant deviation in quantified metabolites compared to the reference values were not confirmed. The main variations were detected in concentration of p-cresol and 3-(3-hydroxyphenyl)-3-hydroxypropionic acid (HPHPA), but we cannot confirm the presence of HPHPA in urine as a biomarker for *Clostridium sp.* overgrowth in the gut. The acquired results indicate higher relative abundance of *Firmicutes* phylum alone may be attributed to increased concentration of p-cresol in urine. Decreased *Bacteroidetes/Firmicutes* ratio was found in the group with the presence of HPHPA in urine.

Conclusions: Metabolites of human urine can be used as biomarkers for alterations of gut microbiota with caution, guided treatment should be administrated only based on gut microbiota analysis results or in combination with urinary organic acid results, but not solely based on organic acid biomarkers.

Brain Injury

Biological Research Nursing

The Impact of Traumatic Brain Injury on Microbiome Composition: A Systematic Review (2020)

Affiliations

Abstract

Traumatic brain injuries (TBIs) are a significant health problem, impacting millions of people every year. Although emerging evidence suggests that the composition of the gut microbiome is altered after TBI, no systematic review has been published on this topic. The objective of the present systematic review is to analyze publications that evaluate the impact of TBI on gut microbiome composition. Research articles were pulled from seven databases. The systematic review was performed following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. In order for publications to be eligible for this review, they had to (1) report on original human- or animal-subjects research, (2) evaluate the impact of TBI on the microbiome, and (3) be written in English and (4) be published in a peer-reviewed journal. Of the seven articles that met these criteria, one involved human participants, while the other six reported on experimental animal studies. All studies found changes in the gut microbiome following TBI, with similar changes in bacterial populations observed across studies. The limitations of these studies included the use of primarily male animals, limitations of 16 S

rRNA gene sequencing, and small sample sizes. This review was also limited by the small pool of studies conducted in this area. In summary, changes in bacterial populations of the gut microbiome, specifically increases in proteobacteria and firmicutes, were observed across the studies. By evaluating the changes in the microbiome resulting from TBI, potential therapeutic interventions could be explored.

Substance Use

Review

Pharmacol Biochem Behav

Substance use, microbiome and psychiatric disorders (2022)

Affiliations

Abstract

Accumulating evidence from several studies has shown association between substance use, dysregulation of the microbiome and psychiatric disorders such as depression, anxiety, and psychosis.

Many of the abused substances such as cocaine and alcohol have been shown to alter immune signaling pathways and cause inflammation in both the periphery and the central nervous system (CNS).

In addition, these substances of abuse also alter the composition and function of the gut microbiome which is known to play important roles such as the synthesis of neurotransmitters and metabolites, that affect the CNS homeostasis and consequent behavioral outcomes.

The emerging interactions between substance use, microbiome and CNS neurochemical alterations could contribute to the development of psychiatric disorders.

This review provides an overview of the associative effects of substance use such as alcohol, cocaine, methamphetamine, nicotine and opioids on the gut microbiome and psychiatric disorders involving anxiety, depression and psychosis.

Understanding the relationship between substance use, microbiome and psychiatric disorders will provide insights for potential therapeutic targets, aimed at mitigating these adverse outcomes.