

Review of Literature: Gut-brain Synergy - Innovations in Microbiome Research for Neural Health and Disease Management

Authors : Nagaveni Hegde, Priya Sharma, Anitha M.

Abstract : A vital network of two-way communication between the central nervous system (CNS) and the gastrointestinal tract, the gut-brain axis has a major impact on both health and illness. This axis revolves around the gut microbiota, a complex ecology of microbes that is essential for controlling brain activity and influencing mood, cognitive activities, and pain perception. Chronic pain and neuroinflammation are caused by microglia, the CNS's resident macrophages, which are impacted by signals from the stomach and the central nervous system. Mechanisms including immune system modulation, vagus nerve pathways, neurotransmitter modulation, and microbial metabolites further mediate this interaction. Numerous neurological problems, such as mood disorders (depression, bipolar disorder), neurodevelopmental issues (schizophrenia, autism), and neurodegenerative diseases, have been linked to dysbiosis, an imbalance in the gut microbiota. The mechanics of gut-brain communication, the factors influencing the composition of the gut microbiome, and the effects of dysbiosis on neurological health are all examined in this review. Furthermore, we discuss state-of-the-art developments in microbiome research that present promising paths for the creation of new treatments for neurological and psychiatric disorders, including microbial profiling, microbiota transplantation, and tailored therapeutics. Knowing how the stomach and brain interact dynamically creates new opportunities for tailored microbiome-based therapies that improve mental health and wellbeing.

Keywords : gut-brain axis, microbiota, dysbiosis, neurological disorders, microglia

Conference Title : ICBAHS 2025 : International Conference on Biomedical and Health Sciences

Conference Location : New Delhi, India

Conference Dates : February 24-25, 2025