

THE GUT-BRAIN AXIS AND EXERCISE MOTIVATION: THE EMERGING ROLE OF THE GUT MICROBIOME

Vinicius Willian Calderon da Silva

Vitor Padovan Piacenti (Univesidade de Marília); Rafael de Oliveira Tabian (Universidade de Marília);
Sandra Maria Barbalho (Universidade de Marília)

RESUMO

Introduction: The interaction between the gut microbiota and the central nervous system, mediated by the gut-brain axis, has highlighted the central role of the gut microbiota in regulating behavioral and metabolic functions, including the motivation to engage in physical exercise. Metabolites produced by gut microorganisms, such as short-chain fatty acids and lipid- derived compounds, act as mediators in bidirectional communication between the gut and the central nervous system, influencing neurobiological pathways related to reward, fatigue, and adaptation to physical exertion.

Objectives: To analyze the role of the gut microbiota in modulating motivation for physical exercise, highlighting the mechanisms of the gut- brain axis and its behavioral and metabolic implications.
Materials and

Methods: This is a narrative review of the literature based on recent articles indexed in PubMed, including experimental studies and systematic reviews published in the last five years, selected using search terms related to the gut microbiota, gut-brain axis, and physical exercise. **Results:** Evidence suggests that the gut microbiota directly influences motivation for exercise by producing metabolites capable of activating peripheral sensory pathways and afferent neural pathways, thereby stimulating dopaminergic signaling in brain regions associated with reward, such as the ventral striatum. Experimental studies demonstrate that gut metabolites can increase exercise endurance and willingness to engage in physical activity, establishing a functional connection between the microbiota and motor behavior. Furthermore, regular exercise promotes beneficial changes in the composition and diversity of the microbiota, with increased microbial diversity and bacteria producing anti-inflammatory metabolites, reinforcing a bidirectional cycle between exercise and the microbiome. On the other hand, a sedentary lifestyle is associated with reduced microbial diversity, intestinal dysbiosis, and metabolic and neuroendocrine changes, which can negatively impact motivation and physical performance. **Conclusion:** The gut microbiota plays a significant role in regulating motivation for physical exercise, acting as an integrative link between metabolism and behavior via the gut-brain axis. Understanding these processes opens up new avenues for therapeutic interventions based on modulating the gut microbiome, with the aim of improving adherence to physical activity and performance; however, further clinical studies in humans are needed to validate and better elucidate these mechanisms and their applicability.

Palavras-chave: Gut Microbiota Gut-brain Axis Physical Exercise Motivation Metabolic Regulation.