



## Benefits of Mycobiome and Challenges Involved in Mycobial Research

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### Description

For centuries, the study of microorganisms has primarily focused on bacteria, overlooking the diverse and intricate world of fungi. However, recent advancements in molecular techniques and sequencing technologies have unveiled the hidden kingdom of fungi and its crucial role in various ecosystems, human health, and disease. This article delves into the emerging field of mycobiome research, exploring its significance, current findings, and the potential it holds in reshaping our understanding of the microbial world.

The human body and the environment host a myriad of microorganisms, with bacteria dominating the microbial research landscape. The mycobiome, comprising the collection of fungi that inhabit these ecosystems, remained largely unexplored until recent years. As researchers delved into fungal communities using high-throughput sequencing, they discovered a wealth of fungal diversity and its intimate interactions with bacteria and other microorganisms.

### The mycobiome and human health

**Gut health:** The gut mycobiome plays a vital role in digestion, nutrient absorption, and maintaining a balanced immune system. Imbalances in the gut mycobiome have been linked to Inflammatory Bowel Diseases (IBD), obesity, and metabolic disorders.

**Respiratory health:** Fungal communities in the respiratory tract can influence respiratory health and may contribute to conditions like asthma, Chronic Obstructive Pulmonary Disease (COPD), and fungal infections.

**Skin health:** Fungi on the skin can influence skin conditions like eczema and dandruff, as well as fungal skin infections.

### Fungi and the environment

The mycobiome extends beyond human and animal hosts, playing a critical role in various ecosystems.

**Soil health:** Fungi are essential decomposers, breaking down organic matter and recycling nutrients in the soil. Understanding the soil mycobiome can lead to improved agricultural practices and sustainable land management.

**Plant health:** mycorrhizal fungi form symbiotic associations with plants, aiding in nutrient uptake and enhancing plant resilience to environmental stressors. Research in this area offers exciting opportunities for sustainable agriculture and biocontrol.

**Aquatic environments:** Aquatic fungi contribute to nutrient cycling and the decomposition of organic matter in water bodies, influencing water quality and ecosystem dynamics.

### Mycobiome dysbiosis and disease

Just like the bacterial microbiome, disruptions in the mycobiome have been associated with various diseases. Imbalances in the gut mycobiome can lead to the overgrowth of pathogenic fungi, causing fungal infections like candidiasis. Dysbiosis in the respiratory mycobiome has been linked to the development of allergies and asthma. Growing evidence suggests a potential link between fungal dysbiosis and autoimmune diseases, such as rheumatoid arthritis and multiple sclerosis.

### Challenges in mycobiome research

Despite the exciting findings, mycobiome research faces several challenges that need to be addressed.

**Technical limitations:** The complex structure and diversity of fungal communities pose challenges in accurately characterizing and identifying fungi using current sequencing technologies.

**Data analysis:** Analyzing mycobiome data requires specialized computational tools and bioinformatic pipelines, which can be a barrier for researchers without specific expertise.

**Standardization and reproducibility:** Establishing standardized protocols and sample collection procedures is critical for ensuring data reproducibility and comparability across studies.

### Conclusion

The burgeoning field of mycobiome research is reshaping our understanding of the microbial world. Fungi, often overshadowed by bacteria, play a significant role in human health, ecosystems, and disease. As researchers continue to explore the intricate interactions between fungi, bacteria, and the environment, the potential applications of mycobiome research in health, agriculture, and environmental conservation are boundless. Embracing the mycobiome as a pivotal player in the microbial landscape will undoubtedly pave the way for innovative therapies, sustainable practices, and a more comprehensive understanding of the delicate balance between microorganisms and their hosts.

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