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Opinion

Gut Microbiome: Current Understanding and Research Needs

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The gut microbiome is a hugely complex ecosystem, but vital to human health. In the last decades, studies have shown that the microbiome plays a significant role in keeping the functionality of the healthy bowel, hormone levels balanced, modulation of immune responses, averting infection, and brain working wholesome. Growing consistents evidence suggests bidirectional signalling between the gastrointestinal tract and the brain, often involving the gut microbiota (microbiota-gut-brain axis) through neural, endocrine, and immune pathways. The gut microbiota has the potential to produce hundreds of products. It is estimated that 90 percent of the body's serotonin is made in the digestive tract. Moreover, each individual is thought to have a personalized microbiome, similar to a fingerprint. Closely-related species of microbes coexist but vary by strain from person to person based on mainly host genetic and diet. Analyses phylogenetic-based on metagenomic data have provided descriptions of the type of microorganisms present in the microbiome, as well as of the functions their DNA encoded. And, simulations of competitive activity using theoretical metabolic models have been run based on available sequence data. The findings of studies added a new dimension to the knowledge of the microbiota and initiated an explosion interest in research in the field of microbiota bacteria. However, the focus of investigations has been primarily on the bacterial microbiome, which constitutes the most abundant and diverse segment of the human intestinal ecosystem. The eukaryotic component of the microbiome (protists) remains relatively unexplored, their relationship with the human host varies from parasitic to opportunistic to commensal to mutualistic. Furthermore, It seems likely that the all Eukaryotic group in the microbiome are potential candidates for a viral co-infection and or symbiotic relationship that may alter biological processes with way malefic or benefits for the host. Indeed, in the gut microbiome, multiple endosymbionts coexist but mostly unrecognized. Integrate the eukaryotic microbes in all future human gut microbiome studies allow a broad view of microbiome function in health and disease. However, it is hard to address and explain the complexity of a microbial community, which covers multi-components, ranging from environmental to genetic factors. It is a complex interaction and multi-factorial (a combination of what the microbiota produce, how they interact with each other and the immune system) in an ultra-competitive environment. And whether the body is then able to suppress or change the immune reaction.

Notoriously, the microbiome is inherently dynamic, substantial biological insights (biotic competition) has evolved with the secretion of digestive enzymes, production of antibiotics or inhibition of quorum sensing. Moreover, how diet interacts with our microbiome and genetic factors, to positively or negatively affect health. The relationship between food for humans and nourishment for bowel bacteria have emerged as an essential factor. Besides, it raises the question of how to distinguish transient microorganisms ingested with food of inhabitants of the digestive tract microbiota members, which may determine biased views of the composition of gut communities.

The characterization of the microbial community and its function is the first step in determining how it potentially affects health and disease human. However, the full understanding of gut microbiome functions requires cultivated microorganisms for experimental validation, enabling the ecology of microbiota to be explained aspects of biology rather than descriptively. However, there is potential for selective growth bias toward specific organisms. Therefore, to further understanding it is necessary of a combination of novel cultured methods, advanced nucleic acid methodologies, data analyses refined, chemical analyses, and physiology should see as support of detailed studies of the microbiota in the bowel ecosystem. Thus, provide will not only deep insight into different aspects of biology but also it will shape new researches applicable about the health, diseases, therapeutic and diagnosis of infections.

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