



## EDITORIAL OPEN ACCESS

# More Than Microbiome and Medicine

Faming Zhang<sup>1</sup> | Sunny H. Wong<sup>2,3</sup> | Yang-Yu Liu<sup>4</sup>

<sup>1</sup>Department of Microbiota Medicine & Medical Center for Digestive Diseases, The Second Affiliated Hospital, Nanjing Medical University, Nanjing, China | <sup>2</sup>Centre for Microbiome Medicine, Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore | <sup>3</sup>Department of Gastroenterology and Hepatology, Tan Tock Seng Hospital, Singapore | <sup>4</sup>Channing Division of Network Medicine, Department of Medicine, Brigham and Women's Hospital and Harvard Medical School, Boston, Massachusetts, USA

**Correspondence:** Faming Zhang ([fzhang@njmu.edu.cn](mailto:fzhang@njmu.edu.cn))

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Recognizing the pivotal role of the microbiome, clinical medicine, and artificial intelligence (AI) in shaping human health across lifespan, *Microbiota Medicine Research* is established to advance knowledge and innovation at this intersection. This journal aims to become a platform for scientific exchange, fostering in-depth collaboration, breaking inter-disciplinary barriers, and advancing the future of medicine.

Humanity has developed countless technologies to alleviate suffering and extend lifespan. From Shennong's legendary tasting of herbs to Hippocrates' foundations of medical thought, through modern medicine, surgical advances, and molecular sequencing technologies, the pursuit of health and longevity has remained a timeless endeavor. However, in the 21st century, the rapid rise of specialization has led to increasing fragmentation in modern medicine. For instance, internal medicine has been divided into gastroenterology, hepatology, pulmonology, cardiology, psychiatry, and so on. These specialized sub-disciplines are further divided into even finer niches. These increasingly refined niches, together with the latest ICD-11—encompassing over 55,000 diseases and its integrated health economics tools, are reshaping contemporary medical practice.

However, these changes are creating significant challenges for the progression of medicine. Concerns about this emerging crisis already have been recognized by some visionary medical researchers and government policymakers. Contemporary medicine requires a unique kind of “suture”—a unifying thread capable of stitching these fragments together. Such a suture must be able to penetrate and align with diverse fields or disciplines. Microbiota medicine (otherwise called microbiome medicine)

embodies precisely this integrative force, with microbes, inflammation, and immunity forming its essential foundation.

The human microbiota forms a symbiotic ecosystem with the host, influencing health and disease throughout the entire lifespan. Nevertheless, our health is challenged with the increasingly aging population, change in disease demographic, shift in our lifestyle including our diets, and rising use of biological and immunomodulatory medications. With the progressive shift from living within natural ecosystems to inhabiting predominantly anthropogenic human-engineered environments, the profiling of human diseases has undergone substantial transformation. Dysbiosis of the human microbiota highlights the ecological niche imbalance between the microbial communities and the host. The four core factors influencing the ecological niche are diet, medications, microbiome, and other host exposure. Dysbiosis-related diseases span numerous typical disciplines, involving almost all human organs and throughout life course. At the core of most modern diseases lies the dysregulation of inflammation, immunity, and metabolism—processes intricately shaped by the microbiota. These fundamental mechanisms drive conditions ranging from refractory infections and post-infectious sequelae to allergies, inflammatory bowel disease, diabetes, cancers, and neurodevelopmental or neurodegenerative disorders, as well as the comorbidities that arise from them.

It is therefore imperative to address dysbiosis-driven inflammation and immune-mediated diseases through new perspectives and innovative technologies, with the aim of rethinking diagnosis, treatment, and prevention, redefining the boundaries

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of disease and health, and realigning medical practice with the fundamental needs of human well-being.

Microbiology laid the foundation for immunology. Over the past two decades, our understanding of the microbiota has evolved from a focus on individual microbes to a systems view of microbial communities and their ecological niches, opening new avenues for medicine. This paradigm shift has given rise to the emerging discipline of microbiome medicine, which embodies the philosophy of holistic integrative medicine and signals a transformative frontier for the future of medicine.

Microbiota medicine technologies, such as fecal microbiota transplantation, probiotics, prebiotics, postbiotics, phage therapy, oncolytic bacteria therapy, oncolytic virus therapy, and bacterial engineering technologies, demonstrate a vigorously developing technological ecosystem. Microbiome sequencing and data mining, washed microbiota transplantation, transendoscopic enteral tubing for colonic administration, and live biotherapeutic products have been milestones that changed clinical practice over the past decade. Minimally invasive techniques, new materials, newly discovered microbes, newly identified metabolites, and AI have provided knowledge and technological foundation for the development of microbiota medicine. Particularly, AI is rapidly changing medical practice. *Microbiota Medicine Research* seeks to foster the development of new technologies and to shape a cohesive technological ecosystem.

Looking back at the history of medical evolution, industrial-scale antibiotics production and the advancement of surgical systems stand as two foundational pillars: the former inaugurated a new era in the control of infectious diseases, whereas the latter, grounded in anatomical intervention, reshaped therapeutics paradigms. Today, the emergence of microbiota medicine, driven by technological innovation and new conceptual frameworks, represents a new pillar of medical progress, establishing a novel paradigm for the prevention and treatment of a broad spectrum of human diseases.

*Microbiota Medicine Research* was launched in 2025. Professor Faming Zhang from Nanjing Medical University, China, Dr. Sunny H. Wong from Nanyang Technological University, Singapore, and Professor Yang-Yu Liu from Harvard University, USA, jointly serve as the founding Editors-in-Chief of *Microbiota Medicine Research*. Professor Zhang and Dr. Wong have long been engaged in microbiome-based translational research and clinical practice. Professor Liu has long been dedicated to microbiome data analysis and modeling, in particular the development/adaptation of AI techniques for microbiome research. The international editorial board will work collectively to promote exchange between the fields of clinical medicine, microbiome research, and AI, and to drive medical progress.

In summary, microbiota medicine is driving a revolutionary transformation in the prevention, diagnosis, and treatment of diseases. *Microbiota Medicine Research* will serve as a platform to integrate cutting-edge advances from diverse fields to broaden the vision for microbiome and medical development. Together

with board members worldwide, it will promote disciplinary integration, re-examine the concept of health, and advance medical practice.

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#### Author Contributions

**Faming Zhang:** conceptualization, writing – review and editing, writing – original draft. **Sunny H. Wong:** conceptualization, writing – original draft, writing – review and editing. **Yang-Yu Liu:** conceptualization, writing – original draft, writing – review and editing.

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#### Conflicts of Interest

Professors Faming Zhang, Sunny H. Wong, and Yang-Yu Liu are the Editors-in-Chief of *Microbiota Medicine Research*. Professor Faming Zhang conceived the concept of GenFMter and transendoscopic enteral tubing and the devices (FMT Medical, Nanjing, China) related to them.