

Special Issue

Microbiome–Gut–Brain Connections: New Windows into Health and Disease

Message from the Guest Editors

The trillions of microbes in the gut profoundly affect other organs, especially the brain. Their crosstalk relies on the microbiome–gut–brain axis, involving 1) microbe-induced neuroimmune responses, 2) microbial metabolites directly affecting brain function, and 3) neuronal signals from gut to brain. Gut microbes aid the processes of neurogenesis, myelination, and microglial maturation. Disruption, due to increased pathogens and gut permeability, impairs the blood–brain barrier, letting neurotoxic substances enter and trigger inflammation or damage. Studies worldwide connect altered gut microbiota with conditions like autism, epilepsy, Alzheimer's, and Parkinson's. Gut microbes are linked to brain health and may help diagnose or treat diseases. Treatments like probiotics, fecal transplants, and targeted diets show promise. Understanding these mechanisms is vital for identifying microbial roles in brain function, offering early tests, and better disease management. This Special Issue highlights new insights into microbiome–brain interactions and their clinical potential.

Guest Editors

Dr. Yating Wan

Medicine and Therapeutics, The Chinese University of Hong Kong,
Hong Kong SAR, China

Dr. Qi Su

Department of Medicine & Therapeutics Faculty of Medicine, The
Chinese University of Hong Kong, Hong Kong SAR, China

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Editorial Office
MDPI, Grosspeteranlage 5
4052 Basel, Switzerland
Tel: +41 61 683 77 34
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Editor-in-Chief

Prof. Dr. Lluís Ribas de Pouplana

Institute for Research in Biomedicine (IRB Barcelona), The Barcelona
Institute of Science and Technology, 08028 Barcelona, Spain

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