

5th International Conference on

Clinical Microbiology and Infectious Diseases

May 25-26, 2026 | Dubai, UAE

Volume: 11

Advancing Clinical Microbiology Through Genomic Diagnostics and Precision Management of Infectious Diseases

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The rapid evolution of infectious diseases and the emergence of multidrug-resistant pathogens continue to challenge healthcare systems worldwide. Advances in clinical microbiology, molecular diagnostics, and genomic technologies are transforming the diagnosis and management of bacterial, viral, fungal, and parasitic infections. This presentation explores recent developments in next-generation sequencing, metagenomic pathogen detection, matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS), and rapid molecular diagnostic platforms that enable accurate pathogen identification within hours rather than days. The session examines how artificial intelligence, bioinformatics, and antimicrobial susceptibility testing are improving clinical decision-making and supporting precision antimicrobial therapy. Recent innovations in microbiome research, pathogen surveillance, and hospital infection control have enhanced the prevention and management of healthcare-associated infections. Future perspectives include integrating genomic epidemiology, digital microbiology laboratories, and personalized infectious disease management into routine clinical practice to strengthen global health security and improve patient care.

Biography

Didier Raoult is Professor of Microbiology and Infectious Diseases at Aix-Marseille University, France. His research focuses on clinical microbiology, emerging infectious diseases, intracellular bacteria, and genomic diagnostics. He has authored hundreds of scientific publications and has made significant contributions to infectious disease research and microbial genomics.