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Infectomic studies on the dual nature of microbial infections: What is the mechanistic connection between exo-symbiosis and endosymbiosis?

Infectomics is a holistic and integrative study of microbial infection using systems biology and omic approaches. The conventional wisdom in medicine holds that microbial infection is a pathogenic process (one-way approach). Our previous studies suggest that symbiosis (Sym) and pathogenesis (Pat) is a duality problem of microbial infection, including HIV/AIDS and other infectious diseases caused by various microorganisms. The dynamic Sym-Pat duality is the two-way paradigm of microbial infection, which is the most fundamental issue of infectomics. Here we propose that the balance between exo-symbiosis (e.g. microbiota) and endosymbiosis (e.g., mitochondria) is essential for our health and that the exo-endo Sym imbalance plays an important role in the pathogenesis of infectious diseases, including HIV/AIDS. It is well known that both microbial translocation across the gut barrier (disturbing exo-symbiosis) and mitochondria-mediated apoptosis (dysregulation of endosymbiosis) are involved with the pathogenesis of HIV/AIDS. However, the mechanistic connection between exo-symbiosis and endosymbiosis is unknown. Both exo-symbiosis and endosymbiosis have been implicated in the development and functions of the immune system. Our model suggests that the exo-endo Sym balance is fundamental to ecoimmunity, where the immune system and microbial communities are viewed as two interrelated and dynamically co-evolving components of a predator-prey ecosystem. Correction of disorders of the ecoimmunity in patients with AIDS may lead to a rational control of HIV infection. Holistic and integrative studies of ecoinfectomes, ecoimmunomes, and microbiome are important for our understanding of microbial pathogenesis and the development of symbiotic solutions to infectious diseases.

Biography

Sheng-He Huang graduated with a major in Molecular Biology and Medicine from Peking Union Medical College (PUMC) and Chinese Academy of Medical Sciences (CAMS) in 1981. He is an Associate Professor at the Department of Pediatrics, University of Southern California. He has published more than 75 peer review papers in reputed journals and served as editorial members of four journals [1. Anti-infective Agents in Medicinal Chemistry. (AIA-MC); 2. Journal of Data Mining in Genomics & Proteomics (JDMGP); 3. Open Journals of Applied Sciences (OJAPPS); and 4. Journal of Scientific Research Report (JSRR)].

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