Improved antibiotic treatments and vaccines against bacterial diseases: Why do we need to understand how the pathogen interacts with the host?

Bacterial diseases cause approximately six million deaths per year. Antimicrobial resistance is increasing and better vaccines are needed. The prevention and treatment of infections must be underpinned by an in depth knowledge of the biology and pathogenesis of the microbes and their interaction with the immune system. Empirical approaches achieve only partial success and do not allow accurate targeting of medical interventions. The location, growth status, between organs spread and interaction with cells of the immune system are key variables of the infection process that affect the efficacy of vaccine-induced immune responses and antibiotics. Our recent work has been focused on the fundamental bases of the biology of invasive Salmonella infections in the light of immune-deficiencies that predispose humans and other animals to these diseases. We have shown that Salmonella has a pathogenesis that is both intracellular and extracellular, with systemic spread in multiple body tissues and several sophisticated mechanisms that allow the bacteria to evade killing by phagocytes and disseminate in the tissues. Salmonellae are vulnerable to antibodies and complement that lyse the bacteria and/or target them to phagocytes, increasing the antimicrobial functions of host cells. We have identified phagocyte receptors, intracellular killing mechanisms and bacterial evasion strategies that affect phagocyte- and antibody-mediated killing of Salmonella. We have also determined the interactions between pathogen location, growth, spread and the efficacy of antibiotic therapy. This work lays a foundation for the development of better vaccines and antibiotic treatments for Salmonella infections and establishes principles applicable to other systemic bacterial diseases.

Biography

Pietro Mastroeni received a Degree in Medicine and Surgery from the University of Messina, Italy. He moved to the University of Cambridge, UK where he completed his PhD before working at the University of Newcastle, UK and then became a Research Fellow at Imperial College, University of London UK. He is currently a Reader in Infection and Immunity at the University of Cambridge, UK. He has published more than 100 papers in reputed journals, many prestigious review articles, edited two books, and serves as an Editorial Board Member for several international journals.

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