

THE MECHANISMS OF ADHERENCE AND PENETRATION OF EUKARYOTIC CELLS BY BACTERIAL PATHOGENS

Summary

Pathogenic bacteria have developed different mechanisms to cause disease in human hosts. Bacterial pathogens express a wide range of molecules that bind host cell targets to facilitate a variety of different host responses. Many bacterial pathogens are able to invade and survive within cells at mucosal membranes. Remarkably, the bacteria themselves orchestrate this process through the exploitation of host cellular signal transduction pathways. Many pathogenic bacteria have evolved strategies to evade the host immune response by subverting the cytoskeleton through various toxins to persuade host cells to take the bacteria into the cell, or in the case mainly of “professional phagocytes” to prevent their uptake into the phagolysosome. They use receptor-mediated endocytosis in invasion. Like other bacteria, *Salmonella* has evolved the habit of invading host cells in order to hide from the immune system

and to gain nutrients. However, *Salmonella* also invades the epithelial cells in order to escape the gut into the surrounding tissues. Whereas *E. coli* binds to the gut epithelial cells, *Salmonella* binds to M cells, present in the Peyer's patches (Lymph nodes) in the gut wall. Interaction of *Sh. flexneri* with individual epithelial cells shows a series of events in which the bacterium, upon contact with the cell surface, releases a set of Ipa proteins through a specialized activable, type-III secretory apparatus. Intracellular invasion can lead to disruption of host tissue integrity and perturbation of the immune system. An understanding of the molecular basis of bacterial invasion and of host cell adaptation to intracellular bacteria will provide fundamental insights into the pathophysiology of bacteria and the cell biology of the host.