FACTORS CONTRIBUTING TO HUMORAL IMMUNITY AGAINST PNEUMONIC PLAGUE

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ABSTRACT

Yersinia pestis is the etiologic agent of plague and is responsible for more human deaths throughout history than any other bacterial pathogen. During infection bacteria inject effector proteins into target host cells using a Type III secretion system (T3SS). Immunity to plague is conferred to the host via antibodies targeting LcrV, an essential component of the T3SS. Although protective anti-LcrV antibodies block injection, the precise mechanism of protection is unknown. As such, we sought here to define the requirements for humoral immunity to plague. We found that protective antibodies not only block T3S, but also opsonize bacteria for phagocytic uptake. Thus, we next examined the role of macrophages in disease clearance and found that while cells limit bacterial replication, they are unable to clear infection. Thus we hypothesized that another immune cell is important for disease clearance and found that recruitment and activation of neutrophils is essential for clearing infection in the presence of antibodies. Together, the data support a model whereby protective antibodies block T3S injection while simultaneously opsonizing bacteria for phagocytic uptake. However, although macrophages limit bacterial replication, cells are unable to kill organisms and rely on neutrophils to clear the infection.