Abstract

The Gram-negative pathogen bacterium Bordetella pertussis is the infectious agent causing pertussis or whooping cough. The infection is dangerous to infants, often being deadly if untreated. Since whole-cell pertussis vaccines have been replaced by acellular pertussis vaccines, pertussis has become the most prevalent vaccine-preventable disease in developed countries. Therefore, the development of a new generation of pertussis vaccines has become a high priority. Opsonophagocytic assays are one method used to assess the efficacy of new vaccines. The main objective of the thesis is to develop opsonophagocytic killing and uptake assays for the measurement of functional antibody activity against Bordetella pertussis. Neutrophils from mice and humans were isolated by three different methods and used for the assessment of different human and mouse sera in opsonophagocytic killing and uptake assays. Different experimental conditions were tested, including multiplicity of infection and serum dilutions. The opsonophagocytic uptake assay proved to discriminate between naïve and immune sera. Serum from mice vaccinated with the whole-cell pertussis vaccine enhanced opsonophagocytic uptake of B. pertussis cells into neutrophils, while serum from mice immunized with the acellular pertussis vaccine did not. These data are in agreement with observations showing a lower efficacy of acellular pertussis vaccines.

Key words: Bordetella pertussis, vaccine, opsonophagocytosis, antibody, neutrophil