A LIPIDATED PROTEIN-BASED MUCOSAL PNEUMOCOCCAL VACCINE IS SELF-ADJUVANTED AND PROVIDES BROAD PROTECTION IN MICE

Dr. Wangxue Chen, PhD
National Research Council Canada

Current licensed pneumococcal vaccines are effective but provide protection against restricted serotypes. The aim of this study was to develop a new pneumococcal vaccine, based on surface proteins that contribute to bacterial virulence and are common to all serotypes, to improve the vaccine coverage against emerging serotypes and reduce vaccine cost. Using a novel protein lipidation platform, we generated a recombinant lipidated PsaA fusion protein (referred as “rlipo-PsaA”) in E. coli using the native PsaA lipid signal peptide. Mice were immunized intranasally with the vaccine with or without mucosal adjuvant and the immunogenicity and protection efficacy against clinical isolates of different serotypes assessed. Intranasal immunization of mice with the rlipo-PsaA vaccine induced potent antigen-specific immune responses including mucosal IgA and the production of Th1 and Th17 cytokines by the splenocytes. Moreover, the vaccine is self-adjuvanted and induced mucosal immunity against co-administered non-lipidated pneumococcal protein antigens which are otherwise non-immunogenic by themselves. More significantly, the vaccine protected mice against intranasal challenge with multiple clinical isolates including serotypes that are not covered by current vaccines in mouse models of invasive pneumococcal disease and nasopharyngeal colonization. Lipidation of surface pneumococcal protein antigens is a promising approach for the development of safe and effective mucosal universal vaccine for S. pneumoniae infection.