



The Future of Pneumococcal Vaccines

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Currently licensed anti-pneumococcal vaccines are composed of simple polysaccharides, or polysaccharides conjugated to a protein carrier and are based on the generation of antibodies and/or immunological memory. In general polysaccharide vaccines are less immunogenic and conjugate vaccines have less inclusive serotype coverage. Importantly, implementations of conjugate vaccine programs have resulted in significant reductions in pneumococcal disease. Future pneumococcal vaccines must address these issues.

Three strategies will be discussed: 1) Expanded/directed valency conjugate vaccines, 2) Protein based vaccines and 3) whole cell vaccines.

- 1) Solving the complexities of constructing conjugate vaccines of expanded/directed valency are the focus of research efforts from diverse origins, including international non-profit organizations, biotechnology groups and pharmaceutical companies. These will either target a number of serotypes large enough to cover disease prevalence globally or additional vaccines that target serotypes prevalent in given areas.
- 2) Protein-based vaccines have the theoretical advantage of being serotype independent. Protein-specific immune responses increase with age in man and may contribute to pneumococcal disease resistance in older children and adults. The main challenge is the identification of proteins that are conserved and protective across serotypes and determining whether antibody responses against selected proteins will elicit opsonophagocytosis killing against pneumococcal serotypes, thereby providing a potential efficacy surrogate for to enable clinical development
- 3) Several groups have contributed to developing a (killed) whole pneumococcal cell vaccine that presents a large number of pneumococcal capsular or non-capsular antigens to the host. Removal of some toxic pneumococcal components is necessary.

The better understanding of the humoral and cellular aspects of pneumococcal immunity will guide further approaches to achieve optimal protection of humans against the pneumococcus.