Pneumococcal Vaccine Project

Mark Alderson

Simposio Subregional del Caribe sobre Neumococo
Santo Domingo, October 2008
To improve the health of people around the world by advancing technologies, strengthening systems, and encouraging healthy behaviors.
PATH’s Vaccine Work

• Vaccines and immunization make up over 50 percent of PATH’s work.

• Our work spans the range of vaccine-related activities from research and development to advocacy, financing, distribution, administration, and uptake.
Pneumococcal Vaccine Project

• Goal: Accelerate development of safe, effective, and affordable vaccines against *S. pneumoniae* in order to reduce childhood acute lower respiratory infections and mortality in Africa and other low-income regions

• Resources: ~US$84 million (2 grants)

• Time frame: 2004 to 2011
PVP Objectives

1. Advance protein vaccine candidates.
2. Support development of low-cost conjugate vaccines.
3. Genome analysis to define vaccine targets.
PVP Objectives

4. Validate immune mechanism of protection against carriage.
5. Pursue other strategies arising from a review of technologies.
6. Engage the pneumococcal research community to advance the field of pneumococcal vaccine development.
Polysaccharide based vaccines

Killed whole bacterial vaccine

Protein-based vaccines

Current vaccines

Novel vaccines

Polysaccharide based vaccines

Protein-based vaccines

90+ types
Vaccine Development Collaborations

• Intercell: common protein vaccine
• Children’s Hospital Boston: whole cell vaccine
• Genocea Biosciences: T-cell antigen discovery
• University of Glasgow: Pneumolysoid fusions
Completed Collaborations

- TIGR (JCVI): genome sequencing
- Serum Institute of India Limited (SIIL): virtual conjugate (pilot funding)
- Oliver Wyman (Mercer): economic driver and cost profile analysis of vaccine candidates
Intercell

- Austrian-based biotechnology company
- Developed Antigen Identification Technology and applied to several candidate products including *S. aureus* and *S. pneumoniae*
- Candidate *S. pneumoniae* vaccine consists of 3 distinct proteins
Antigen discovery at Intercell

Learn from individuals who’s immune system has encountered the pathogen

Antibodies → Genomic peptide libraries → Vaccine → Protection

Serum from exposed and diseased humans
Bacterial surface display (10 to 150 amino acids)
Defined peptides/proteins
Defined adjuvant
Animal models
Clinical trials
Children’s Hospital Boston

- Development of an inactivated whole cell vaccine for Phase 1 clinical trials
- Low cost to manufacture, requires no refrigeration and could be given orally or intranasally
- CHB established partnership with Butantan Institute in Brazil for developing-world manufacture
Conjugate Vaccines: Advantages

- Proven efficacy and effectiveness
  - High efficacy against invasive disease (caused by vaccine serotypes)
  - 20-35% reduction in radiological pneumonia
  - Successful clinical trials in Africa
- Regulatory path is clear (WHO guidelines - non-inferiority to Prevnar®)
- Herd immunity
Conjugate Vaccine Strategy

PVP Objective: “Support preclinical and clinical development of a polysaccharide conjugate vaccine whose cost structure would allow for production, sale, and ready supply at prices more affordable to public-sector purchasers”

• Target is limited valency vaccine designed to meet or exceed WHO/GAVI TPP for the AMC

• May include pneumococcal protein carrier or addition of pneumococcal protein (Pld)

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<thead>
<tr>
<th>Vaccine</th>
<th>Serotypes Included</th>
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<tbody>
<tr>
<td>Prevenar®</td>
<td>4, 6B, 9V, 14, 18C, 19F, 23F</td>
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<td>PATH PCV-7</td>
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Research Collaborations

• Infectious Disease Research Institute: adjuvant evaluation

• University of Witwatersrand (RMPRU): Antibody responses to protein antigens

• Johns Hopkins University: pneumococcal surveillance in Pakistan

• University of Bristol: cell-mediated immune responses to pneumococcal proteins

• Fill finish of new human pneumococcal reference serum pool (89SF replacement)
Research Collaborations cont.

- Landspitali University Hospital: animal models of pneumococcal challenge
- University of Alabama consortium: animal models of pneumococcal challenge
- Emory University/CDC/UAB: pneumococcal strain bank
- University of Alabama: new diagnostic assay
- University of Maryland, Institute for Genome Sciences (IGS): Sybil Pneumococcal Genomics package
# PVP Portfolio

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<th>Research</th>
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<th>Phase 1</th>
<th>Phase 2</th>
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<td>3. Intercell</td>
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Mark Alderson, PhD, MBA
Director, Pneumococcal Vaccine Project
malderson@path.org

www.path.org