Researchers discover new vaccine candidate for Pseudomonas aeruginosa

July 6 2012

Researchers at Brigham and Women's Hospital (BWH) have discovered a new vaccine candidate for the bacterium *Pseudomonas aeruginosa* taking advantage of a new mechanism of immunity.

The study was published online in the American Journal of Respiratory and Critical Care Medicine on June 21, 2012.

Pseudomonas aeruginosa is a leading cause of hospital-acquired infections, particularly in patients on respirators, where it can cause so-called ventilator-associated pneumonia, which carries a very high mortality rate. *Pseudomonas* also causes lung infections in people with cystic fibrosis, a genetic disorder that renders the lungs susceptible to bacterial infection.

Despite more than 40 years of vaccine research and development, there is no clinically available vaccine for this bacterium. Most prior vaccine efforts have focused on generating antibodies to *Pseudomonas* toxins or surface molecules, especially the sugar coating on the bug called the lipopolysaccharide O antigen. These approaches have not yielded a licensed vaccine for humans.

Gregory Priebe, MD, BWH Division of Infectious Diseases, Department of Medicine, and Boston Children's Hospital Division of Critical Care Medicine, Department of Anesthesiology, Perioperative and Pain Medicine, along with researchers from Harvard Medical School, constructed a vaccine based on a new mechanism of immunity to

Pseudomonas mediated by T helper 17 (Th17) cells. Th17 cells are a recently described type of helper T cells that secrete the cytokine IL-17 and enhance antibacterial mucosal defenses.

In the current studies, the investigators designed a screen for Th17-stimulating protein antigens expressed by a molecular library of DNA encoding *Pseudomonas* proteins. The screen discovered that the Pseudomonas protein PopB is a very effective stimulator of Th17 immunity, and immunization with purified PopB protected mice from lethal pneumonia in an antibody-independent fashion.

The researchers are currently taking their work a step further by constructing conjugate vaccines using PopB as a protein carrier with the hopes of improving the effectiveness of the vaccine. They hope that the PopB-based vaccine might one day be used to prevent *Pseudomonas* infections in hospitalized patients and in people with cystic fibrosis.

Provided by Brigham and Women's Hospital