MedicalXpress

Study reveals potential improvements for effectiveness of meningococcal vaccines

September 9 2016

A study conducted by UCSF Benioff Children's Hospital Oakland Research Institute (CHORI) scientists shows greatly improved protective antibody responses to a new mutant vaccine antigen for prevention of disease caused by *Neisseria meningitidis* - also known as meningococcus - that has the potential to improve the current vaccines for meningitis.

The study, "Enhanced Protective Antibody to a Mutant Meningococcal Factor H-Binding Protein with Low Factor H Binding," authored by Children's Hospital Oakland Research Institute (CHORI) scientists Dan Granoff, MD, and Peter Beernink, PhD will be featured in the September 8th, 2016 issue of the Journal of Clinical Investigation Insight.

"This study in infant monkeys builds on our previous research in mice with mutant antigens and has the potential to greatly improve protection elicited by current vaccines targeting meningococcal disease," says Dr. Granoff, Director of CHORI's Center for Immunobiology and Vaccine Development.

Meningococci are bacteria responsible for causing meningitis and severe bloodstream infections. Infants less than a year of age and teenagers are the age groups most at risk of disease. Currently, there are two vaccines in use in teenagers in the U.S. for serogroup B strains of the bacteria. There are no serogroup B vaccines for infants. Both vaccines utilize an antigen called Factor H-binding protein (FHbp). The FHbp antigen in the vaccines binds with human Factor H (fH), which is a protein

normally present in the bloodstream.

FHbp specifically binds human and some non-human primate FH proteins. The investigators hypothesized that binding of FH to the vaccine depress protective antibody responses, which they had previously found in a model with mice that made human FH. In the new study, the researchers immunized infant rhesus macaques with either a conventional recombinant FHbp antigen that bound FH (similar to the antigens used in current meningococcal B vaccines), or a mutant antigen with 2 amino acid substitutions that eliminated binding of FH. The mutant antigen gave up to 15-fold greater protection as defined by the ability of the antibodies in the bloodstream to kill the bacteria.

Replacing FHbp antigens in the currently licensed meningococcal B vaccines with a mutant low-FH binding antigen should enhance protective antibody responses. This is especially important given the results of a recent study published in the New England Journal (Basta et al, 375:220-228, 2016) that found that a third of students immunized with a meningococcal B vaccine to control an outbreak on a college campus failed to develop protective antibodies.

"With 15 fold higher protective antibody response to the new mutant FHbp antigen, our results have the potential to lead to greatly improved meningococcal vaccines that can effectively target more strains of the bacteria." Also, the new mutant vaccine was protective in monkeys as young as 3 months of age and, thus, has the potential to confer protection to human infants who in the age are most vulnerable to disease and for whom currently there is no vaccine.

Provided by Children's Hospital & Research Center Oakland