COMBATTING FUTURE BIOLOGICAL THREATS – HOST-DIRECTED INTERVENTIONS TO EMERGING THREATS FOR RAPID RESPONSE

A Novel Omv Adjuvant, T-vant, Enhances The Efficacy Of The Acellular Pertussis Vaccine

Allyson Hirsch Tulane University **Michelle Galeas-Pena** Tulane University **Nicole Lamond** US Food and Drug Administration **Yihui Wang** US Food and Drug Administration **Tod Merkel** US Food and Drug Administration **James McLachlan** Tulane University **Lisa Morici** Tulane University

Pertussis (Whooping cough) is a vaccine-preventable respiratory disease caused by the Gram-negative coccobacillus Bordetella pertussis. The licensed acellular pertussis (aP) vaccines protect against disease but do not prevent bacterial colonization and transmission. T-vant is a novel adjuvant derived from bacterial outer membrane vesicles that can elicit both mucosal and systemic immune responses. We sought to characterize the immune responses elicted by an aP vaccine adjuvanted with T-vant in mice and in baboons. We hypothesized the aP vaccine adjuvanted with T-vant would enhance mucosal immunity and eliminate B. pertussis in the respiratory tract. In contrast to animals immunized intramuscularly with a licensed alum-adjuvanted aP vaccine, intranasal immunization with aP-T-vant eliminated bacteria in both the lung and nasopharynx of mice by 3 weeks post-infection. Protective immunity was associated with an increase in IFN-g and IL-17-producing, non-circulating CD4+ T cells in the lung and nasopharynx, and sterilizing immunity in the nasopharynx was dependent on IL-17. In addition, aP-T-vant induced mucosal IgA and higher serum IgG compared to mice immunized with the traditional aP vaccine. In baboons, both intramuscular and intranasal immunization with aP-T-vant prevented disease and cleared B. pertussis from the nasal tract faster than alum-adjuvanted aP. These results suggest that novel adjuvants, such as T-vant, warrant further investigation to enhance the efficacy of next generation vaccines for respiratory pathogens.

This work was supported by the Defense Threat Reduction Agency under the Rapid Assessment of Platform Technologies to Expedite Response (RAPTER) program (award no. HDTRA1242031) and by NIH adjuvant development contract NIH 272201800045C. The authors would like to thank Dr. Traci Pals and Dr. Bob Webb for their support of this work.