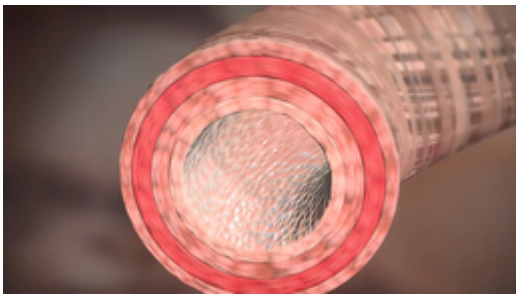
INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

Role of Nanoemulsion Vaccine in Chronic Cockroach Allergic Asthma

TECHNOLOGY NUMBER: 2019-481



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Category
Therapeutics and Vaccines
Life Sciences

Inventor
James Baker Jr.
Jessica O'Konek
Nicholas Lukacs

Further information
Tiefei Dong
tiefeid@umich.edu

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OVERVIEW

A nanoemulsion adjuvant vaccine that is effective for chronic allergic asthma

- Reduces histopathology and disease associated parameters in severe asthma in mice
- Employs a mouse model that facilitates chronic allergen-induced airway remodeling

BACKGROUND

Exposure to indoor allergens is known to exacerbate asthma, with asthma symptoms due to cockroach exposure having been recognized as an incidence in the prevalence of this illness since the 1940s. Cockroach allergen exposure correlates more strongly with asthma morbidity than do exposures to dust mites or pest allergens. Cockroach-derived protease disturbs airway epithelial integrity and leads to an increased penetration of allergen proteins, resulting in activation of innate immune cells that direct cells of the adaptive immune system and lead to the lung inflammation and increased sensitization. The rates of wheezing and asthma-related hospitalizations are higher among children who are skin test positive to cockroach antigen. Still, the specific mechanisms by which these allergens lead to airway hyperresponsiveness (AHR) and loss of function are poorly understood, so a need exists for an improved method to determine the most important mechanistic pathways.

INNOVATION

Researchers have discovered an approach that employs a clinical grade skin allergen test that has no endotoxin combination and allows outstanding consistency of response. The mouse model they use facilitates chronic allergen-induced airway remodeling that is accompanied by intense peribronchial leukocyte recruitment, mucus hypersecretion, development of AHR, and

significant peribronchial and airway thickening. A vaccine using a nanoemulsion adjuvant altered the ongoing immune response by skewing the responses away from the dominant T helper 2 (Th2) cytokine profile. The nanoemulsion vaccinated mice displayed a significantly protected phenotype with improved airway function, reduced mucus production, less airway pathology, and a significant decrease in Th2 induced disease. Thus, the nanoemulsion vaccine provided clinical improvements that may be protective in chronic severe steroid resistant asthmatic disease.