

Enhancing immune responses in a variety of applications with a lymph node targeting biodegradable nanoparticle

Unmet Need

While vaccines have resulted in plummeting mortality rates in the human population over the last century, significant challenges remain for which current vaccine formulations fall short. For example, current influenza vaccines are unable to protect the entire population due to limited efficacy in certain populations, such as the elderly who are not always immune-responsive. Additionally, the allergen immunotherapy is widely used to treat hypersensitivities to environmental or food allergies, but includes risk of severe adverse effects, high associated costs, and the requirement of many years of treatment. Even with the use of adjuvants, the resulting immune responses of vaccine formulations are still often suboptimal. The inherent toxicity of adjuvants makes identifying safe options a difficult task. There is an urgent unmet need for developing safe, effective methods for enhancing immune responses to better combat a range of afflictions, including influenza, food allergies, cancer, asthma, and bacterial infections.

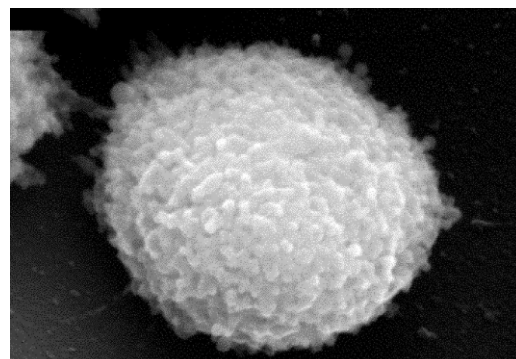
Technology

Duke inventors have reported a method for eliciting an immune response intended to be used in applications such as improving influenza vaccines and allergen immunotherapies. This technology involves packaging vaccine antigen and immunomodulatory cytokines in biodegradable nanoparticles comprised of herapin and chitosan as an adjuvant. The synthetic particles replicate attributes of mast cell granules *in vivo* including the targeting of draining lymph nodes and the timed release of the encapsulated mediators. Inventors have demonstrated superior and protective adaptive immune response in mice when used as an adjuvant with an influenza vaccine. Additionally, this novel approach was used to effectively protect against peanut-induced anaphylaxis in mice.

Advantages

- A first-in-class adjuvant approach that can be tailored to

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 **Links**

- [From the lab of Dr. Herman Staats](#)
- [From the lab of Dr. Soman Abraham](#)

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improve immune response for applications ranging from infectious disease, allergies, and cancer

- Particularly applicable for subpopulations who are less immune-responsive to standard vaccine formulations
- A biodegradable and biocompatible system with broad applicability that offers low toxicity

Publications

- [Synthetic mast-cell granules as adjuvants to promote and polarize immunity in lymph nodes \(Nat Mater, 2013\)](#)
- [Mast cell-derived particles deliver peripheral signals to remote lymph nodes \(J Exp Med, 2009\)](#)
- [Reprogramming Immunity to Food Allergens \(J Allergy Clin Immunol, 2018\)](#)
- [Issued US Patent 8,802,076](#)
- [Issued US Patent 9,782,475](#)
- [Issued US Patent 10,245,319](#)

Patents

Patent Number: 8,802,076

Title: LYMPH NODE-TARGETING NANOPARTICLES

Country: United States of America

Patent Number: 9,782,475

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