Recombinant Allergens with Altered Crosslinking Capacity for Improved Immunotherapy

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Technology description

State-of-the-art imaging along with refined quantitative measures and computation approaches are used to understand how authentic allergens crosslink and activate the human receptors.
For the first time, high resolution imaging approaches are used to evaluate the diffusion and redistribution of a specific receptor on the membranes of allergen-challenged human primary cells and connect these events to signal propagation, desensitization and internalization. This novel way of analyzing allergen structures allows for reengineering various allergens to create a version that can be used for immunotherapy without causing an allergen reaction when administered.

Background

Allergies and associated diseases are among the most common health problems in the developed world. These conditions include life-threatening asthma and food allergies, as well as allergic rhinitis, atopic dermatitis and severe antibiotic reactions. The US Center for Disease Control estimates that more than 50 million Americans are currently affected with various allergens ranging in different severities. The rising incidence and severity of food allergies in children is a particularly troubling phenomenon. Nearly 1 in every 13 children suffers from some form of allergy. The economic cost of children’ s food allergies is nearly $25 billion per year.
Currently, there has been very little attempt to quantify and dose an antigen needed to reach a signaling threshold in human cells. There is also very little information about the critical structural features of allergens that determine mast cell and basophil responsiveness. Further research and testing may prove beneficial in discovering new treatment methods that are safer and more effective for treating allergens.

Technology Description

Dr. Bridget S. Wilson and fellow researchers, at the University of New Mexico, bring state-of-the-art imaging, refined quantitative measures and computational approaches to understand how authentic allergens crosslink and activate the human receptors. For the first time, high resolution imaging approaches are used to evaluate the diffusion and redistribution of a specific receptor on the membranes of allergen-challenged human primary cells and connect these events to signal

propagation, desensitization and internalization. This novel way of analyzing allergen structures allows for reengineering various allergens to create a version that can be used for immunotherapy without causing an allergen reaction when administered.

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Application area

Hypoallergen mixes will form the basis of new immunotherapy regimens for desensitizing allergic subjects in allergy clinics in the US and worldwide
Defines how allergen valency and epitope spacing determine the number and orientation of receptor subunits within cross-linked aggregates
Determines the threshold of allergen required for stimulation of both the early phase and late phase of the allergic response
Application of fluorescence microscopy and biophysical techniques to the study of cell signal transduction

Institution

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