Bioinformatics approaches to assess safety of novel proteins in relation to food hypersensitivity

Hosted by the HESI Protein Allergens, Toxins, and Bioinformatics Committee

October 17 – 18, 2018
Tivoli Congress Center, Copenhagen, Denmark

Workshop Abstract: In the growing field of allergy research, scientists can approach protein characterization and allergy hazard assessment in diverse ways. The Health and Environmental Sciences Institute (HESI) Protein Allergens, Toxins, and Bioinformatics (PATB) committee supports original basic research that seeks to uncover the interplay between protein allergenicity and the physicochemical properties of allergenic proteins. The PATB also oversees the creation, maintenance and distribution of the Comprehensive Protein Allergen Resource (COMPARE) Database whose use in conjunction bioinformatic tools, offers an effective means for assessing allergenic potential of novel food proteins. PATB's focus on basic allergy research, coupled with bioinformatic methods for allergenic hazard assessment is unique within the scientific community as it supports an ever-increasing awareness of allergenicity among consumers and regulators. Topics to be covered in this workshop will include historic aspects of food allergy assessment, the evolution of bioinformatics as it relates to allergy assessment, and recent changes in regulations regarding novel food proteins.

This educational workshop will cover advances in protein allergy research and inform the use of novel approaches for the identification of potential food allergens. This event will be of interest to government regulators, those involved in food allergy and celiac disease research, and scientists involved in food safety and risk assessment.

Goals & Objectives:

- Evaluate bioinformatics approaches to characterize the allergenicity potential of novel proteins and inform allergy safety assessment.
- Discuss real-world examples of: 1) a product development case-study describing the utility of bioinformatics in protein characterization, and 2) practical applications of the EFSA 2017 Guidance.
- Provide insights from new research, ranging from modifications of allergen epitopes at the single amino-acid level, to using protein structural modeling for allergenicity prediction, to the relation between enzymes and allergenic activity.

Wednesday, October 17th – Arkaden Room 4-5 (2nd Floor)

8:00 – 8:30 AM	Continental Breakfast
	Welcome remarks and introduction – Lars Poulsen, University of Copenhagen
8:30 – 9:00 AM	Overview of contributions and research of the HESI PATB to Bioinformatics Analysis of the Potential Allergenicity of Novel Proteins – Greg Ladics, Dupont

<u>Session I: Bioinformatics Approaches to Protein Characterization and Allergy Safety Assessment</u>

9:00 – 9:30 AM	A history of bioinformatics: development of *in silico* approaches to evaluate food proteins – Andre Silvanovich, Bayer Crop Science
9:30 – 10:00 AM	Protein sequence analysis tools and resources to detect potential allergens – Rob Finn, European Bioinformatics Institute (EBI)
10:00 – 10:30 AM	Break
10:30 – 11:00 PM	Case Study: Allergenic risk of insect proteins – Kitty Verhoeckx, TNO
11:00 – 11:30 PM	The COMPARE Allergen Database: a public, comprehensive protein allergen resource for allergenicity safety assessment – Lars Poulsen, University of Copenhagen
11:30 – 12:00 PM	Novel methods to identify allergenicity potential of proteins – Sebastian Maurer-Stroh, *A*STAR* Bioinformatics Institute (BII), Singapore
12:00 – 12:45 PM	Panel Discussion
12:45 – 1:45 PM	Lunch

<u>Session II: Other Considerations for Allergen Safety Assessment</u>

1:45 – 2:15 PM	The PATB "Allergen Rebuild Project": can the conservative replacement of amino acids in an allergen epitope affect IgE binding and cross-reactivity? – Ronald van Ree, Academic Medical Center, University of Amsterdam
2:15 – 2:45 PM	Development of a Random Forest model for predicting allergenicity of new and modified proteins– Tanja Krone, TNO
2:45 – 3:15 PM	Break
3:15 – 3:45 PM	Cross-reactive carbohydrate determinants and allergenicity – Edzard Spillner, Aarhus University
3:45 – 4:30 PM	Panel Discussion – Additional experimental assays for consideration

*6:00 PM	Networking Reception – all registered attendees invited Location: IDA Conference, Tower Restaurant (Kalvebod Brygge 31-33 1780 København V.)

Thursday, October 18th – Arkaden Room 4-5 (2nd Floor)

8:00 – 8:30 AM Continental Breakfast

Session III - Non-IgE Mediated Allergy

8:30 – 9:15 AM Overview of known non-IgE mediated diseases and progress in immunology of non-IgE diseases – Antonella Cianferoni, Children's Hospital of Philadelphia

9:15 – 10:00 AM *In silico* tools to predict potential celiac disease toxicity – Frits Koning, Leiden University

10:00 – 10:45 AM Application of EFSA 2017 bioinformatic guidance for non-IgE mediated immune disease – Andre Silvanovich, Bayer Crop Science

Considerations for small peptide analyses in SGF – Scott McClain, Syngenta

10:45 – 11:00 AM Break

11:00 – 11:45 AM Panel Discussion – Role of bioinformatics in advancing the knowledge of other, less characterized non-IgE diseases

Session IV – Closing Session

11:45 – 12:15 PM Workshop Wrap-Up

About the Protein Allergens, Toxins, and Bioinformatics (PATB) Committee:

Website**:** http://hesiglobal.org/protein-allergens-toxins-and-bioinformatics-committee-patb/ The website contains the PATB fact sheet that describes committee activities, committee publications, information on past workshops, and information on other committee achievements.

About HESI:

The Health and Environmental Sciences Institute (HESI) is an independent non-profit dedicated to bringing together global teams of scientists from academia, government, industry, and NGOs to solve the most pressing risk and safety challenges facing humans and the environment today.

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