

TITLE - Measurement and analysis of patient and staff-reported experience in high-volume ocular surgery: the case of cataract surgery and intravitreal injections.

Boehm TM (1,2), Codreanu-Morel F (3), Wanniang N (1,2), Morisset M (4), Petit-Cordebar V (3,5), De Beaufort C (2,6,7), Graf T (1), Hilger C (1), Hunewald O (1,8), Bazon ML (1), Olivry T (9), Ollert M (1,10), Kuehn A (1)

1) Department of Infection and Immunity, Luxembourg Institute of Health, Esch-sur-Alzette, Luxembourg.

2) Faculty of Science, Technology and Medicine, University of Luxembourg, Esch-sur-Alzette, Luxembourg.

3) Department of Allergology and Immunology, Centre Hospitalier de Luxembourg-Kanner Klinik, Luxembourg.

4) Allergy Unit, Angers University Hospital, Angers, France.

5) Pediatric Allergy department, Children's Hospital, University of Nancy, Vandœuvre-lès-Nancy, France.

6) Diabetes & Endocrine Care, Clinique Pédiatrique, Centre Hospitalier de Luxembourg, Luxembourg, Luxembourg

7) Department of Paediatric Endocrinology, UZ-VUB, Jette, Belgium

8) Bioinformatics & AI, Department of Medical Informatics, Luxembourg Institute of Health, Strassen, Luxembourg.

9) Nextmune, Stockholm, Sweden

10) Department of Dermatology and Allergy Center, Odense Research Center for Anaphylaxis, Odense University Hospital, University of Southern Denmark, Odense, Denmark.

Background

Allergies are a major public-health burden with a prevalence up to 40%. The underlying immune mechanism, based on a hypersensitivity reaction to normally harmless molecules of our environment, includes the production of allergen specific IgE-antibodies. We aimed to develop a new computational workflow to analyze complex allergy-related antibody signatures, for use in both epidemiology and clinical practice.

Methods

We analyzed deep serum IgE signatures in dogs living in 30 different European countries. Unsupervised clustering was applied to identify IgE patterns for correlations to local pollen exposure (Copernicus database). This computational pipeline was then applied to human IgE and IgG4 signatures, which were measured during oral immunotherapy, for correlation with treatment outcome.

Results

Using a total of N=5,585 samples (1.3 Mio data points), we identified 11 clusters of sensitization across Europe that were found to be dependent on the regional origin of the sera ($P < 0.0001$). Amongst the signifier allergens, >90% were found to be relevant for human allergies, e.g. pollen allergens. Pollen allergen clusters correlated with regional pollen exposure, reiterating their interpretability and relevance in the human context. We then succeeded to apply the data clustering tool on a cohort of food-allergic children undergoing oral immunotherapy (12,600 data points). We revealed that patients with successful therapy outcome had significantly stronger IgG4 signatures, reflecting immune adaptability and plasticity, developing during the therapy and after successful desensitization ($P < 0.05$).

Conclusion

Overall we successfully established a data analysis workflow for complex antibody profiles in the allergy context with relevant information for clinical practice.

BIOSKETCH

(Maximum one page)

NAME, SURNAME: *Theresa-Maria, Boehm*

TITLE: *MSc Master of Science*

ORCID ID: *0009-0001-9883-0955*

CURRENT AND PAST POSITIONS:

PhD student in Doctoral School in Science and Engineering, University of Luxembourg, conducting research at the Luxembourg Institute of Health - LIH – From April 2023 to present time

EDUCATION:

Master of Science in Functional Materials, Julius-Maximilians-University of Wuerzburg; Germany, 2023

Bachelor of Science in Functional Materials, Julius-Maximilians-University of Wuerzburg; Germany, 2021

AWARDS AND HONORS:

Award for Outstanding Poster Presentation: Allergen Exposure across Europe: A Spatially Resolved Approach to the Analysis of Deep canine IgE Profiles – at the European Academy of Allergy and Clinical Immunology (EAACI) Annual Congress 2025 in Glasgow, Scotland