

ORAL PRESENTATION

Open Access

Immunoglobulin E and G4 epitopes of the major allergen of birch pollen Bet v 1 share residues critical for antibody binding

N Groh¹, B Subbarayal², L Vogel¹, C Möbs³, NW de Jong⁴, W Pfützner³, RG van Wijk⁴, J Lidholm⁵, L Meisel¹, S Randow¹, T Holzhauser¹, B Bohle², S Vieths¹, D Schiller^{1*}

From Food Allergy and Anaphylaxis Meeting (FAAM 2013) Nice, France. 7-9 February 2013

Background

Millions of patients with allergy to birch pollen develop clinically cross-reactive IgE against Bet v 1-like proteins in plant foods. Specific immunotherapy (SIT) with birch pollen extracts induces the biosynthesis of Bet v 1-specific immunoglobulin (Ig)G $_4$. IgG $_4$ is believed to act as a blocking antibody preventing IgE binding to Bet v 1, thus alleviating allergic symptoms. Only little information on the location and relationship of IgE and IgG $_4$ binding sites of Bet v 1 is available. In this study we seek to identify epitopes of IgE and IgG $_4$ antibodies on Bet v 1.

Methods

A competitive immunoscreening of phage-displayed peptides was applied to predict Bet v 1 epitopes of allergen-specific IgE and Ig G_4 antibodies by bioinformatic means. Predicted epitope residues potentially critical for antibody binding were substituted by site-directed mutagenesis. Recombinant Bet v 1 (rBet v 1) and rBet v 1 variants were purified from *Escherichia coli*. The proteins were physicochemically characterized using circular dichroism (CD) and dynamic light scattering. To test the IgE and Ig G_4 interactions with rBet v 1 variants, western blot analyses, ELISA, and cellular mediator release assays were performed.

Results

Several rBet v 1 variants were expressed in *E. coli*. Circular dichroism and structural modeling of the variants revealed Bet v 1-like theoretical secondary structure topology. The rBet v 1 variants showed reduced IgE and IgG_4 binding with sera of birch pollen allergic subjects in western blot analyses and competitive ELISAs. The rBet v 1 variants showed decreased IgE-mediated mediator release in humanized rat basophil leukemia cells sensitized with sera of birch pollen allergic subjects.

Conclusion

We identified critical residues in IgE and IgG_4 epitopes of Bet v 1. Although patient-specific variability was observed, the antibody interactions of the respective rBet v 1 variants were compromised for both IgE and IgG_4 , respectively. We conclude that epitopes for IgE and IgG_4 share common residues critical for antibody interaction, suggesting an overlap of IgE and IgG_4 -binding sites on the molecular surface of Bet v 1. The knowledge of clinically relevant immunoglobulin-allergen interactions on the molecular level enables new strategies in the diagnosis, prognosis, and therapy of both birch pollen allergies and birch pollen-related food allergies.





Disclosure of interest

None declared.

Author details

¹Division of Allergology, Paul-Ehrlich-Institut, Langen, Germany. ²Pathophysiology and Allergy Research and Christian Doppler Laboratory for Immunomodulation, Medical University of Vienna, Vienna, Austria. ³Department of Dermatology and Allergology, Philipps University Marburg, Marburg, Germany. ⁴Department of Allergology, Erasmus MC-University Medical Center, Rotterdam, the Netherlands. ⁵Thermo Fisher Scientific, Uppsala, Sweden.

Published: 25 July 2013

doi:10.1186/2045-7022-3-S3-O15

Cite this article as: Groh *et al.*: Immunoglobulin E and G4 epitopes of the major allergen of birch pollen Bet v 1 share residues critical for antibody binding. *Clinical and Translational Allergy* 2013 **3**(Suppl 3):O15.

Submit your next manuscript to BioMed Central and take full advantage of:

- Convenient online submission
- Thorough peer review
- No space constraints or color figure charges
- Immediate publication on acceptance
- Inclusion in PubMed, CAS, Scopus and Google Scholar
- Research which is freely available for redistribution

Submit your manuscript at www.biomedcentral.com/submit

