

Characterization of nasal provocation-induced changes in transcription factors in birch pollen-allergic and non-allergic individuals

G. Lamorte¹, J. Basilio¹, A. Meshcheryakova¹, T. Kalic Kamath^{2,1}, S. Sudharson^{2,1}, D. Mechtcheriakova¹, C. Hafner², H. Breiteneder¹

¹Medical University of Vienna, Department of Pathophysiology and Allergy Research, Center of Pathophysiology, Infectiology and Immunology, Vienna, Austria, ²Karl Landsteiner University of Health Sciences, Department of Dermatology, University Hospital St. Pölten, St. Pölten, Austria

Type selection

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General data

Track: Clinical Immunology

Topic: Allergy

Abstract text

Text: Introduction: Birch pollen is one of the major elicitors of pollinosis in Europe. Interaction of birch pollen (BP) with airway epithelial cells results in an immune response, which can lead to allergic sensitization in certain individuals. Our group has previously characterized the cellular responses to BP nasal provocation (NP) in BP-allergic individuals. Data on transcription factors (TFs) regulating these clusters of pro-inflammatory genes in BP-allergic individuals are still missing.

Objectives: To characterize TF-based gene expression profiles in birch pollen-allergic and non-allergic individuals after BP-NP.

Methods: We extracted the publicly available gene expression data set under the accession number GSE261239. Instead of a traditional differential expression analysis, which focuses on differential expression genes (DEGs), we implemented alternative approaches such as hierarchical and k-means clustering to identify distinct groups of genes that might share biological functions. In addition, we applied Weighted Correlation Network Analysis (WGCNA), followed by Over-Representation Analysis (ORA) using the Molecular Signatures Database (MSigDB) as reference for biological interpretation.

Results: Hierarchical clustering analysis showed greater distances between gene expression patterns in the allergic compared to the non-allergic cohort. By setting the distance threshold to 30, we identified four gene clusters in the allergic and three in the non-allergic cohort. In the allergic cohort, clusters related to inflammatory responses driven by the activation of TFs such as AP1, GABP and IRF1 were enriched, whereas TFs related to cellular stress responses were enriched in both, the allergic and the non-allergic cohort.

Conclusion: Our results demonstrate the activation of TFs related to inflammatory responses in allergic patients after NP, which does not occur in non-allergic individuals. These dissected analyses open a new perspective to study the roles of novel targets and key players in BP allergy. Supported by the Danube Allergy Research Cluster 2.0, P04 funded by the Country of Lower Austria.

Conflict of Interest statement

Do you have any conflict of interest to declare?: No

Affirmation

- 1. Consent to participate and present onsite:** Yes
- 2. Consent to publication publication:** Yes
- 3. Consent on treatment of contact details saved in this system:** Yes