V10 Assessing the Th2-sensitizing potential of birch pollen: A cell-culture-based approach

S. Gerkhardt[1,2], L. Pointner[3], A. Bethanis[2], L. Aglas[3], C. Traidl-Hoffmann[1,2,4], and S. Gilles[1,2]

[1]Environmental Medicine, Faculty of Medicine, University of Augsburg, Augsburg, Germany, [2]Institute of Environmental Medicine, Helmholtz Zentrum Munich, Germany, [3]Department of Biosciences and Medical Biology, University of Salzburg, Salzburg, Austria, [4]Christine Kühne Center for Allergy Research and Education (CK-CARE), Davos, Switzerland

Background: Birch pollen are major causes of seasonal allergic rhinitis. Allergic immune responses to birch pollen are characterized by a T helper cell type 2 (Th2)- and IgE-dominated immune response directed against Bet v 1, the major birch pollen allergen. However, purified Bet v 1 alone does not initiate Th2 responses in mouse models and the sensitization driver(s) remain elusive. Aim of study: Identification and characterization of this driving factor in the birch pollen matrix is important for understanding the underlying pathway in allergic sensitization. Methods: An aqueous birch pollen extract (BPE) was fractioned via size exclusion chromatography and the derived fractions were pooled in order to obtain 3 main fractions with distinct protein profiles (F1, F2, and F3). Human dendritic cells (DCs) differentiated from CD14+ monocytes from 7 allergic and 15 non-allergic donors were stimulated for 24 hours with the BPE fractions as well as with unfractionated BPE and comparable concentrations of lipopolysaccharide (LPS). The expression of maturation markers and cytokines

was measured. To mimic the natural way of sensitization, nasal epithelial cells – as cells that have the first contact to pollen – were stimulated with BPE and the comparable concentrations of LPS. The expression of cytokines and chemokines were measured. Results: The fraction F1 mostly induced cytokine secretion such as IL-10, TNFα, IL-6, and IL-8 and the upregulation of maturation markers CD40, CD83, and CD86. Both IL-10 and IL-8 were induced more in non-atopic donors after stimulation with F1. CD86 is in general more expressed in atopic donors, with no difference in expression in F1 compared to non-atopics. CD40 showed the opposite picture. A lower concentration of BPE 0.185 µg/mL lead to a higher secretion of the measured cytokines/chemokines than the concentration of 0.75 µg/mL. Conclusion: We identified a non-Bet v 1-containg high-molecular weight fraction (F1) as the main immunostimulatory fraction inducing human DC maturation and cytokine secretion. In the future, it is necessary to pinpoint the molecular nature of the compounds contained in F1 in order to identify the pollen-intrinsic driver of allergic sensitization.