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Annika Eggstein, Swetlana Gerkhardt, D.-L. Nguyen, Ayse Sener, Matthias Reiger, R. Zeidler, Elke Hümmer, Johannes Zenk, Claudia Traidl-Hoffmann, Stefanie Gilles

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V11 Co-exposure of nasal epithelial cells to different bioaerosols at the air-liquid interface

A. Eggestein[1,2], S. Gerkhardt[1,2], D.-L. Nguyen[1,2], A. Sener[1,2], M. Reiger[1,2], R. Zeidler[3], E. Hümmer[4], J. Zenk[4], C. Traidl-Hoffmann[1,2] and S. Gilles[1,2]

[1]Chair of Environmental Medicine, Faculty of Medicine, University of Augsburg, Augsburg, [2]Institute of Environmental Medicine, Helmholtz Zentrum München, Neuherberg, , [3]Institute of Structural Biology Helmholtz Zentrum München, Neuherberg, [4]Department of Otolaryngology, Augsburg University Medical School, Augsburg, Germany

Background: During the COVID-19 pandemic, a positive correlation between spring pollen counts and SARS-CoV-2 infection rates was observed. Shortly before, it had been shown in a human rhinovirus infection model that pollen attenuated the type I and type III interferon response of nasal and bronchial epithelial cells, resulting in increased virus production in the cells. These findings led to the hypothesis that the epithelial immune response to coronaviruses might also be impaired by pollen aerosols. Aim of study: To characterize the immune response of nasal epithelial cells in a physiological model of aerosol co-exposure to pollen and coronaviruses. Methods: Primary human nasal epithelial cells from nasal brushes and conchotomic surgery specimens were cultured at the airliquid interface for up to 4 weeks to yield fully differentiated nasal epithelia. The cultures were stimulated with different concentrations of birch pollen, either applied as aqueous birch pollen extract (BPE), as birch pollen suspension (BPS) or as birch pollen aerosol (BPA) (VitroCell® Powder X device), and incubated for 24 and 48 hours. Cytokines and chemokines were measured in apical washes and basolateral supernatants. Results: There was a significant difference in the proinflammatory cytokine response (IL-8, IL-6, IL-1b and TNF-a) between cells derived from male and female donors: Whereas male donors' cells hardly showed any proinflammatory cytokine response to pollen stimulation, female donors' cells responded to pollen stimulation with a strong proinflammatory cytokine response. Different cytokine responses resulted from different application forms of pollen: the commonly used pollen suspension or pollen extracts resulted in the release of cytokines into different compartments than exposure to the more physiological aerosol exposure. Outlook: Nasal epithelial cells from allergic donors will be stimulated in the same setup and results will be compared to the response of non-allergic donors' cells. Established coronavirus infection models (hCoV 229E, NL63) will be combined with pollen aerosol exposure to investigate the host antiviral response under co-exposure to coronaviruses and birch pollen.