EFFECT OF RAGWEED POLLEN EXTRACT ON THE IL-1β EXPRESSION OF MACROPHAGES AND DENDRITIC CELLS

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Introduction: Innate immunity has important role in the recognition of pathogen-derived molecular patterns and altered self-motifs. These patterns can be recognized by pattern recognition receptors, like intracellular Nod-like receptors.

Some members of NLR family can form protein complexes, which are called inflammasomes. NLRP3 inflammasome contains NLRP3 sensor, ASC adaptor and effector caspase-1 enzyme. Upon activation of inflammasome, caspase-1 cleaves inactive pro-IL-1β into active, pro-inflammatory IL-1β. NLRP3 inflammasome activation requires two signals. The first signal is necessary for the expression of inflammasome components, the second is important for the protein complex assembly.

Main sources of IL-1β are macrophages and dendritic cells. It is known, that macrophage and dendritic cell-produced IL-1β has important role in the development of pollen-induced allergic rhinitis symptoms. Enhanced presence of IL-1β has been demonstrated in patients suffering from allergic rhinitis, but it is unclear whether NLRP3 inflammasome is involved in this process in macrophages and dendritic cells. Therefore we aimed to study the effect of ragweed pollen extract on IL-1β expression in human monocyte-derived macrophages, dendritic cells, and in THP-1 macrophage cell line.

Pollens are often contaminated with bacterial motifs, like lypopolysaccharide (LPS). It is known, that LPS can trigger the first signal of NLRP3 inflammasome activation, therefore we studied the effect of ragweed pollen in combination with LPS as well.

Methods: Monocytes were separated from human „buffy coat", then differentiated into macrophages and dendritic cells. Cells were treated with ragweed pollen extract and LPS, and the IL-1β secretion was determined by ELISA, pro-IL-1β and NLRP3 gene expression changes were studied by quantitative RT-PCR.

Results: Our results show that ragweed pollen extract alone is not able to induce IL-1β and NLRP3 expression in THP-1 macrophages and dendritic cells, but in GM-CSF-macrophages we detected moderate enhances in the IL-1β mRNA and cytokine expression. We found that ragweed pollen extract enhanced LPS-induced IL-1β secretion in human macrophages and dendritic cells. We also demonstrated, that LPS-induced mRNA expression of pro-IL-1β and NLRP3 can be further enhanced with ragweed pollen extract in macrophages and dendritic cells as well.

Summary: Ragweed pollen extract enhances LPS-induced IL-1β secretion and NLRP3 expression in human macrophages and dendritic cells.