Tuning immune tolerance against mugwort pollen allergy using full-length altered-peptide ligand of Art v 1 encapsulated in virus-like nanoparticles

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Type selection

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General data

Track: Immunological Diagnostics and Therapies

Topic: Allergen-specific immunotherapy

Would the presenting author be interested in applying for a travel grant? Yes

Abstract text

Text: **Background**

We here used a virus-like nanoparticle (VNP) platform to encapsulate the full-length major mugwort pollen allergen Art v 1, harboring a single amino acid substitution (APL#11) in its immunodominant peptide, aiming to induce differential TCR signaling and skew Th cell responses as a prophylactic treatment for mugwort allergy.

Methods

VNPs encasing a full-length version of his-tagged Art v 1 APL#11 were generated by fusion with MAp15 (Moloney murine leukemia virus, matrix protein). To evaluate prophylactic efficacy of VNPs, TCR/DR1-transgenic allergy mice received two intranasal doses of VNPs containing 1 mg of Art v 1 two weeks apart, followed by three challenges with mugwort pollen extract (MPE) every other week, with mice sacrificed on day 63. Serum Art v 1-specific antibody levels were monitored and immunophenotyping of bronchoalveolar lavage fluid (BALF) and lung cells was performed using multiparametric flow cytometry.

Results

After three MPE challenges, mice that received VNPs with APL#11 Art v 1 showed reduced Art v 1-specific serum IgE, IgG1, and IgG2a levels and significantly lower numbers of eosinophils, inflammatory neutrophils, B and T cells in the BALF compared to control mice. Despite similar levels of $CD103^+$ dendritic cells, the number of $Ly6C^+$ B cells in the lungs of APL#11 Art v 1-treated mice was significantly lower than in control mice. CD4+ T cells generally appeared to be less differentiated after treatment, and expressed lower levels of signature transcription factors. Notably, a significant decrease in the number of IL-17+ T cells was observed in the treated mice, while the number of IFN-γ-producing T cells was similarly high.

Conclusion

VNPs containing shielded APL#11 Art v 1 can modulate allergen-specific T cells, thereby attenuating priming by subsequent allergen exposure, and thus position themselves as a promising candidate for future mugwort pollen allergy vaccines.

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