

Engineering and characterization of a recombinant cat allergy vaccine for allergen-specific immunotherapy

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Abstract text

Text: *Objective:* Cats are one of the most important respiratory allergen sources worldwide, causing various allergic symptoms, including asthma. The most effective allergy therapy is allergen-specific immunotherapy (AIT), but cat allergen extract-based AIT vaccines have a high risk of therapy-induced side effects.

Methods: Five recombinant fusion proteins (named PreS-Cat 1-5) consisting of the hypoallergenic peptides from important cat allergens in different order and the hepatitis B virus-derived PreS surface antigens were expressed in *E.coli*, purified and characterized. The allergenic activity of PreS-Cat antigens was assessed by measuring IgE reactivity by ImmunoCAP and basophil activation in patients with cat allergy. Induction of specific blocking IgG production was evaluated in rabbit immunization experiments, followed by testing of PreS-Cat-induced IgG antibodies' ability to inhibit IgE-binding to allergens. Activation of T-cells and induction of cytokines by PreS-Cat proteins and cat allergens was analyzed in cultured peripheral blood mononuclear cells (PBMC) from cat-allergic patients.

Results: PreS-Cat 1-5 showed a significantly reduced IgE reactivity and a lack of basophil activation The production of Fel d 1, Fel d 4, and Fel d 7-specific blocking IgG antibodies was induced in rabbits after two injections of PreS-Cat 1, PreS-Cat 3 and PreS-Cat 5. PreS-Cat-induced antibodies that strongly inhibited allergen-specific basophil activation. In addition, PreS-Cat 5 and PreS-Cat 1 induced significantly more tolerogenic cytokine IL-10 in PBMC cultures compared to cat allergens.

Conclusion: PreS-Cat protein is a promising candidate for allergen-specific immunotherapy in cat-allergic patients and can be evaluated in clinical trials.

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Conflict of Interest statement

Do you have any conflict of interest to declare?: Yes

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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