Recombinant PreS-fusion protein vaccine for birch pollen and apple allergy

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Abstract

Background: Respiratory birch pollen allergy and associated oral allergy syndrome affect more than 150 million people. IgE cross-sensitization to major birch pollen allergen Bet v 1 and pathogenesis-related (PR10) plant food allergens is responsible for the pollen-food allergy syndrome. Methods: We designed a recombinant protein, AB-PreS, consisting of non-allergenic peptides derived from the IgE binding sites of Bet v 1 and the cross-reactive apple allergen, Mal d 1, fused to the PreS domain of HBV surface protein as immunological carrier. AB-PreS was expressed in E. coli and purified by chromatography. The allergenic activity of AB-PreS was tested using sera and basophils from birch pollen patients allergic. The protective effect of AB-PreS was assessed by inhibition ELISA test using sera allergic patients and from immunized rabbits. Results: IgE-binding experiments and basophil activation test revealed the hypoallergenic nature of AB-PreS. IgG antibodies induced by 5 injections with AB-PreS inhibited allergic patients’ IgE binding to Bet v 1 and Mal d 1 better than did IgG induced by up to 30 injections of six licensed birch pollen allergen extract-based vaccines. Additionally, immunization with AB-PreS induced HBV-specific antibodies potentially protecting the infection. Conclusion: The recombinant AB-PreS-based vaccine is hypoallergenic, safe and superior to currently registered allergen extract-based vaccines for the treatment of the birch pollen food allergy syndrome.