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

Musa Khaitov[1], Igor Shilovskiy [1], Rudolf Valenta[1], Milena Weber[2], Korneev Artem[1], Inna Tulaeva[2], Pia Gattinger[2], Marianne van Hage[3], Gerhard Hofer[4], Jon Konradsen[5], Walter Keller[6], Oluwatoyin Akinfenwa[2], Alina Poroshina[1], Nataliya Ilina[1], Elena Fedenko[1], Olga G. Elisyutina[1], Alla Litovkina[1], Evgenii V. Smolnikov[1], Alexandra Nikonova[1], Sergei Rybalkin[7], Vladimir Aldobaev[7], Valeriy Smirnov[1], Nadezhda Shershakova[1], Olga Petukhova[1], Dmitry Kudlay[1], Artem Shatilov [1], Anastasia Timofeeva [1], Raffaela Campana[2], Sevastyan Rabdano[8], Victor Trukhin[8], Sergey Udin[9], and Veronica Skvortsova[10]

[1]FGBU Gosudarstvennyj naucnyj centr Institut immunologii Federal'nogo mediko-biologiceskogo agentstva Rossii
[2]Medizinische Universitat Wien Zentrum fur Pathophysiologie Infektiologie und Immunologie
[3]Karolinska Institutet Institutionen for medicin Solna
[4]Stockholms universitet Lararhogskolan i Stockholm
[5]Karolinska Institutet Institutet for miljomedicin
[6]BioTechMed-Graz Geschaftsstelle
[7]Rossijskij nacional'nyj issledovatel'skij medicinskij universitet imeni N I Pirogova
[8]St Petersburg Research Institute of Vaccines and Serums of the Federal Medical Biological Agency
[9]Federal State Budgetary Institution "Centre for Strategic Planning and Management of Biomedical Health Risks" of the Federal Medical Biological Agency
[10]Federal'noe mediko-biologiceskoe agentstvo Rossii

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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.

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