



Capabilities of Molecular-Based Allergen Diagnostics in Atopic Diseases

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Abstract

One hundred thirty-one assays were performed to determine the level of specific IgE to major molecular components of the birch pollen—rBet v 1, timothy grass pollen—rPhl p1, rPhl p 5b, and house dust mites—nDer p1, rDer p2 as well as to the minor components of birch pollen—rBet v 2, rBet v 4, timothy grass pollen—rPhl p7, rPhl p 12, and house dust mites rDer p10 in patients with asthma ($N = 66$) and allergic rhinitis ($N = 65$). It is well established that sensitization to major and minor allergens facilitates the selection of an allergen for the allergen-specific immunotherapy (ASIT). According to the concept of molecular-based allergen diagnostics, the ASIT efficacy is expected to be high when IgE to major components are present and antibodies to minor components are absent. When elevated IgE levels to major and minor ASIT proteins are present, a moderate ASIT efficacy is expected.

Keywords Molecular-based allergen diagnostics · Major allergen · Minor allergen · Allergen-specific immunotherapy

1 Introduction

Molecular identification of allergen components involved in the atopic and autoimmune diseases became possible with the practical application of biotechnologies. Panels of recombinant and natural molecules for various allergens have been developed (tree, grain and weed pollens, house dust mites, food-borne allergens, and pet dander) and used for diagnostic. Natural extracts used in a routine practice contain large number of epitopes. Therefore, utilizing molecular components of each allergen increases the sensitivity and specificity of diagnostic tests. Molecular (component) diagnostics utilized in the ImmunoCAP technology (Phadia, Sweden) has been proven valuable to identify the allergen. Molecular-

based allergy (MA) diagnostics is an approach used to map the allergen sensitization of a patient at a molecular level, using purified natural or recombinant allergenic molecules (allergen components) instead of allergen extracts (A WAO-ARIA-GA²LEN consensus document on molecular-based allergy diagnostics) [1, 2]. The most important aspects of MA diagnostics are ability to identify a causative molecule, discriminate specific and cross-reactive molecules and capability to determine the structure of the allergen [3].

One of the most important aspects of MA is the evaluation of the effectiveness of allergen-specific immunotherapy (ASIT) in patients with seasonal and allergic rhinoconjunctivitis, atopic bronchial asthma, and anaphylactic reactions [4–6]. MA of the sensitization profiles improves the selection of patients for the ASIT and minimizes the use of ASIT in patients with polysensitization (sensitization to three or more groups of allergens) [6–8]. Recent study has shown that the use of MA improved the ASIT results when compared to prick tests [5]. Although the MA is currently used in clinical allergy diagnosis, further studies are needed to select the categories of patients for ASIT.

The ImmunoCAP (Phadia) technology, which is used for MA, is designed to detect ultra-low concentrations of immunoglobulins and inflammation markers in extremely small sample size. Technically, this is achieved by using a solid

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