Molecular diagnostics to determine the effectiveness of allergen-specific immunotherapy (ASIT)

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OBJECTIVES

Molecular-based allergen diagnostics (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). Recent study has shown that the use of MA improved the ASIT results when compared to pric- tests. Although the MA is currently used in clinical allergodiagnosis, further studies are needed to select the categories of patients for ASIT. (Jutel M. (2011); Cox L.(2009); Sastre J. (2010).

According to the concept of MA 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 (Canonica G.W. (2015)

METHODS

The aim was to select an allergen for ASIT in patients with polysensitization and / or with a discrepancy between the data of allergic history and skin testing with extracts of allergens.

130 studies have been conducted to identify the increased level of specific Ig E (asIgE) for molecular components in patients birch pollen rBet v1, rBet v2; rBet v4, timothy pollen rPhl p1, rPhl p 5b, rPhl p7, rPhl p12, and dust mites nDer p1, rDer p2 by ImmunoCAP Phadia IDM in patient with bronchial asthma (BA (N=64), allergic rhinitis (AR) (N=66). BA has comorbidity with AR (47%), allergic conjunctivitis (39.4%), oral allergy (36.7%). AR was accompanied by allergic conjunctivitis (80%), symptoms of oral allergy (60%). Patients included in the study were sensitized to house dust mites (46.6%), pollen trees (74.8%), pollen grass (57.3%).

RESULTS

Panel molecular antibody assays to components of birch, timothy grass pollen and house dust mites

Level	Birch allergen components N= 64		Timothy allergen components N= 42		House dust mite allergen components N= 24		
	Bet v 1 % (Abs.f) (95%CI)	**Bet v 2 % (Abs.f) (95%CI)**	**Phl p 1,5b % (Abs.f) (95%CI)**	**Phl p7,12 % (Abs.f) (95%CI)**	**Der p1 % (Abs.f) (95%CI)**	**Der p 2 % (Abs.f) (95%CI)**	**Der p10 % (Abs.f) (95%CI)**
<0.35 kUA/l (0)undetectable	9.37 (6) 4.4-19.0	84.38 (54) 73.6-91.3	9.30 (4) 3.4-22.0	81.40 (35) 67.4-90.3	32.33 (8) 18.0-53.3	8.33 (2) 2.3-25.8	91.67 (22) 74.2-97.7
0.35-0.7 kUA/l (1)very low	-	-	9.30 (4) 3.4-22.0	-	8.33 (2) 2.3-25.8	8.33 (2) 2.3-25.8	8.33 (2) 2.3-25.8
0.7-3.5 kUA/l (2)low	15.62 (10) 8.7-26.4	-	18.6 0(8) 9.7-32.6	-	8.33 (2) 2.3-25.8	8.33 (2) 2.3-25.8	-
3.5-17.5 kUA/l (3)moderate*	3.13 (2) 0.9-10.7	9.37 (6) 4.4-19.0	34.88 (15) 22.4-50.0	9.30 (4) 3.7-22.0	8.33 (2) 2.3-25.8	16.67 (4) 6.7-35.9	-
17.5-50 kUA/l (4)high	34.38 (22) 24.0-47.0	3.13 (2) 0.9-11.0	16.28 (7) 8.1-30.0	9.30 (4) 3.7-22.0	24.0 (6) 12.0-45.0	33.33 (8) 18.0-53.3	-
50-100 kUA/l (5)very high	18.75 (12) 11.1-30.0	3.13 (2) 0.9-11.0	11.63 (5) 5.1-24.5	-	8.33 (2) 2.3-25.8	24.0 (6) 12.0-45.0	-
>100 (6)above the limit of detection	18.75 (12) 11.1-30.0	-	-	-	8.33 (2) 2.3-25.8	-	-

Sensitization to rBet v1 was detected in 87%, to rBet v2, rBet v4 in 16.1%; to rPhl p1, rPhl p 5b in 80%, to rPhl p7 rPhl p 12 in 16.1%; to nDer p1 in 66.6%, to nDer p2 in 91.6%.%, to nDer p10 in 8.3%.

The data obtained indicate that the prevailing level of antibodies to the major component of birch rBet v 1 was very high and the level was above the detection limit, and the predominant level of antibodies to the minor component rBet v 2 was average sensitization. These data indicate that high level of antibodies to the major birch component rBet v 1 (> 100 kUA/l) was prevalent, with moderate sensitization to the minor component rBet v 2.

Moderate and high antibody levels were prevalent among reactivity to the major timothy grass pollen components (rPhl p1, rPhl p 5b). The moderate and high level sensitization to minor timothy grass pollen components were prevalent (rPhl p7, rPhl p 12).

The assay of antibodies to major house dust mite molecular components demonstrated that high specific antibody level to the cysteine proteinase was prevalent (nDer p1). Also high and very high antibody levels to the second major allergen component (core protein MPC-2) were detected (nDer p 2)

Additionally, 8.33% of patients were sensitized to tropomyosin (nDer p10), a minor house dust mite molecule component.

When selecting an allergen for ASIT it is important to consider clinical symptoms, when most severe symptoms are observed, symptoms duration and their effect on a patient's quality of life, as well as which allergen can be most difficult to avoid. Detection sensitization to major and minor allergens helps selection of an allergen for ASTI in patients with poly-sensitization, complex clinical history and results of skin testing with allergen extracts.

CONCLUSIONS

The obtained data suggest that when evaluating the effectiveness of ASIT, it is also necessary to take into account the level of antibodies; maximum efficiency is predicted at a very high level (grade 5,50-100 kUA/l) and a level above the detection limit (grade 6> 100 kUA / l) - according to this concept in case of specific treatment of a group of patients with an increased level of antibodies to the major molecular component of birch (rBet v 1) and the main allergen component of house dust mites (rDer p2) in combination with the middle and lower class of minor components