

Studying The Spectrum Of Allergenic Sensitization Of The Population In The Regions Of The Republic Of Uzbekistan

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Abstract

One of the most modern and effective methods for studying allergology is molecular allergological research. [1]. Thanks to this method, we have the opportunity to diagnose allergic diseases at the molecular level, make an accurate diagnosis, identify the main major molecule of the causal allergen, establish cross-sensitization and conduct effective immunotherapy [1,2]. Very high therapeutic effectiveness of immunotherapy leads to a decrease in the incidence of allergic diseases [3].

Keywords: Molecular allergology, Allergens, Sensitization, allergen molecule and extracts.

Relevance: Today, the prevalence of allergic diseases among the world community is increasing and amounts to 40% in various countries. This is mainly due to changes in the environment, widespread chemization of everyday life, uncontrolled use of various medicines, in particular antibacterial drugs, early administration of feeding infants, irrational nutrition of the population and a number of other factors [4].

In the diagnosis of allergic diseases, it is important to accurately identify etiological allergens that cause the disease. We know that the sensitization of allergens in patients depends on the hereditary predisposition, living conditions, geographical location and age. Long-used by allergists, skin samples are « the golden standard » surveys for 130 years, but they have their own contraindications and age limits [5,6].

In recent years, molecular allergic research has allowed the detection of allergens that cause diseases at the molecular level. In addition, this method allows for the effective diagnosis and prevention of cross- and polyvalent sensitization in patients [7,8].

ALEX is a multicomponent testing method that allows you to simultaneously determine the level of antibodies to both molecular components and extracts of allergens in blood and get an almost complete picture of the sensitization of each patient. The ALEX test is based on unique nanotechnology. The ALEX test is equipped with adapted software that allows you to analyze individual allergenic panels according to clinical needs - it has multiplex technology (on demand). The ALEX multicomponent test is saturated with strong cross-tanned reactive carbohydrate determinants (SSDs), which during incubation interact with serum and allow accurate quantitative results of specific IgE in the patient's blood [9].

The peculiarity of the ALEX test (SSDs) – as a result of a sharp intersection of reactive carbon allows you to directly and clearly interpret the results of the analysis in patients with sensitivity to determinants and increases the specificity of the method. Allows you to simultaneously determine the level of general and specific IgE. ALEX test is a new generation test used to diagnose 1st type allergic reactions (in vitro). The ALEX test covers more than 99% of all standard diagnostic tests, identifying 295 species: 178 different allergen molecules and 117 extracts, including the total IgE level [10].

Purpose: studying the spectrum of allergenic sensitization of the population of the Republic of Uzbekistan using the modern molecular allergological test ALEX.

Material and methods. The study was conducted at the Republican Scientific Specialized Allergological Center in 100 patients who applied for outpatient and inpatient care. Patients of the study group were given an allergological test on ALEX molecular allergistics equipment. Patients were divided into 4 groups by age: children under 5 years old - 24 (24%); 6-18 years old - 41 (41%); 19 - 45 years old - 28 (28%) and older than 45 years - 7 (7%). Из них женщин - 42 (42%) и мужчин - 58 (58%). By regions: from the Bukhara region - 5 (5%), from the Jizzakh, Namangan, Syrdarya regions (1%), from Kashkadarya, Surkhandarya regions 6 (6%), Republic of Karakalpakstan - 1 (1%), Samarkand region - 9 (9%), Tashkent - 37 (37%), from Tashkent region - 15 (15%), Ferghana - 7, Khorezm region - 4 (4%), Andijan region - 2 (2%) and Navoi region - 5 (5%) patients were examined. Patient blood tests using the ALEX test revealed 295 species of molecules and extracts of allergens, including the level of total Ig E.

Research object. The object of the study was 100 patients with respiratory allergic anamnesis: with allergic rhinitis, rhinoconostymitis (38), allergic nettle rattles + Quinket (21), atopic dermatitis <TA, acute obstructive bronchitis with an allergic component (11), insecure allergy (2), toxicodermia (1) and drug allergy (1). All patients underwent specific molecular allergological diagnostics and, according to the results of the study, were divided into 8 large groups: pollen allergens, ticks, plant allergens, insects and their poisons, epidermal allergens and others.

Research Results. Pollen allergy sufferers were divided into 3 main groups: weed grass, meadow grass, trees. When studying molecules and allergen extracts, the following results were obtained. (table 1)

Table 1 The main molecular components of allergens and the number of sensitized patients

Plant name	Name of allergen molecule (AM) or extract		Diagnosed Sensitization in Patients, %	The age of sensitized patients, %			
				Up to 5 years, %	6- 18 years old,%	19-45 years old,%	Older than 45 years old,%
Phleum pratense	Phl p 1	AM	21	19	43	38	0
	Phl p 2	AM	14	21	36	36	7
	Phl p 12	AM	14	29	57	14	0
Cynodon dactylon	Cyn d 1	E	14	14	57	29	0
Lolium perenne	Lol p 1	E	16	6	50	44	0
Chenopodium album	Ama r	E	25	47	47	6	0
Ambrosia	Amb a1	AM	17				
Artemisia vulgaris	Art v 1	AM	17	35	53	6	6
Plantago	Pla l 1	AM	9	15	62	15	8
Salsola	Sal k	E	32	25	44	31	0
	Sal k 1	AM	27	11	52	37	0
Populus	Pop n	E	15	33	67	0	0
Alnus	Aln g 1	AM	20	25	40	30	5
Cupressus arizonica	Cup a 1	AM	19	21	53	26	0
Phoenix dactylifera	Pho d 2	AM	19	37	42	21	0

The subjects have very high sensitization (the level of specific immunoglobulin E > 15 kUa/L) to 24 of 58 different allergens (24 extract and 34 molecular allergenes) to pollen allergens.

Table 2 Levels of specific immunoglobulins to pollen allergens (extracts and molecules)

Extract or molecule	Name of extract or molecule	Number of patients with high sensitization	The ratio of patients with very high sensitivity in% to patients with overall sensitivity	Extract source or molecule source	Name of extract or molecule	Number of patients with high sensitization	The ratio of patients with very high sensitivity in% to patients with overall sensitivity
Extract	Urt d	1	8	Profilin	Phl p 12	3	22
	Cyn d	1	7		Bet v 2	1	8
	Pas n	1	6		Pho d 2	5	27
	Ama r	4	28		Mer a 1	1	13
	Art v	4	27	Pectate Lyase	Cry j 1	2	17
	Pla l	2	22	Ole e 1-Family	Che a 1	1	25
	Sal k	2	7		Pla l 1	2	22
Beta-Expansin	Cyn d 1	8	57	Plant Defensin	Art v 1	1	6
	Lol p 1	6	38		Pla a 1	5	39
	Phl p 1	9	43	Grass Group 5/6	Phl p 5.0101	3	75
	Phl p 2	1	7		Phl p 6	1	20
Pectin Methylesterase	Sal k 1	18	67	nsLTP	Art v 3	4	100

We examined the high degree of sensitization in patients using pollen sensitization among different age groups as an example.

Table 3 Pollen sensitization among patients of different age groups

Name of molecule or allergen extract	Patient age	Ig E Level for Sensitized Patients		
		Ig E value slightly increased (1 - 5 kUa/L)	Average increase in Ig E (5 - 15 kUa/L)	Excessive increase in Ig E (> 15 kUa/L)
Cyn d 1	Up to 5 years	0	0	2
	6 -18 years old	1	1	6
	19 - 45 years old	2	1	0
Phl p 1	Up to 5 years	1	1	1
	6 -18 years old	1	1	6
	19 - 45 years old	2	2	2
Pho d 2	Up to 5 years	2	0	2

	6 -18 years old	1	1	3
	19 - 45 years old	1	1	0
Pla l 1	Up to 5 years	2		2
	6 -18 years old	1	1	4
	19 - 45 years old	0	0	2
Sal k 1	Up to 5 years	0		2
	6 -18 years old	0	2	10
	19 - 45 years old	0	3	7

When studying sensitization to various food allergens: legumes, fruits, nuts, cereals and animal products, the following results were obtained :

Table 4 Sensitization to food allergens

Food allergens	Name of allergen molecule (AM) or extract		Total number of patients with detected sensitization (%)	The age of patients with diagnosed sensitization (%)			
				Up to 5 years, %	6- 18 years old, %	19-45 years old,%	Older than 45 years old,%
Soya	Gly m 5	AM	48	23	44	25	8
Peas	Pis s	E	6	67	33	0	0
Corn	Zea m 14	AM	6	83	0	17	0
Kiwi	Act d 2	AM	31	26	42	26	0
Melon	Cuc m 2	AM	14	29	57	14	0
Apple	Mal d 1	AM	3	67	33	0	0
Brazil nut	Ber e	E	6	50	33	17	0
Almonds	Pru du	E	5	60	20	20	0
Cow's milk	Bos d 4	AM	4	100	0	0	0
Egg white	Gal d_white	E	6	83	17	0	0
	Gal d 2	AM	8	50	13	12	0
Egg yolk	Gal d 5	AM	6	83	17	0	0

22% of the patients examined revealed the greatest sensitization to the allergen of the cat Fel d 1. Sensitization to epidermal allergens is presented in the following table.

Table 5 Sensitization to epidermal allergens

Pet Name	The age of patients with diagnosed sensitization (%)		
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	Name of allergen molecule (AM) or extract		Total number of patients with detected sensitization, %	Up to 5 years, %	6- 18 years old, %	19-45 years old,%	Older than 45 years old,%
Dog	Can f_Fd1	AM	10	30	70	0	0
	Can f 3	AM	4	75	25		
Cat	Fel d 1	AM	22	23	64	14	
	Fel d 7	AM	4		100		
Cow	Bos d 2	AM	5	20	40	20	
Horse	Equ c 1	AM	5	40	60		

The total immunoglobulin E in 41 patients was 100 and higher, in 33 patients – 20 and lower, in 26 – the indicator was from 20 to 100. In 5 patients, sensitization to allergens was not detected. Sensitization to the Phleum pratense antigen Phl p 1 was diagnosed in 21 patients, the number of specific immunoglobulin E averaged 20.05. This indicator proves the high pollen sensitization of the population to this plant. In 9 patients (42%) sensitization to the Phleum pratense molecule Phl p 1, Phl p 12 - in 17 patients (81%), in 15 (72%) – to the Cynodon dactylon molecule Cyn d 1, at 12 (42%) – to the Phoenix dactylifera antigen Pho d2, at 12 (42%) – to the Salsola antigen Sal k. As part of the Bet v 2 birch antigen, which was studied first contains actin-binding profilin, which is the main protein of cross-food sensitization to many vegetables and fruits. In 12 (12%) patients of the studied group were diagnosed sensitization to the Bet v 2 profilin. In 100% of patients with sensitization to Bet v2 also diagnosed sensitization to Phl p 12, in 11 (92%) patients to the Phoenix dactylifera antigen Pho d2, in 8 (67%) patients to the Mercurialis annua antigen Mer a1, in 12 (100%) to the Cucumis melo antigen Cuc m 2, in 10 (84%) to the Profilin antigen Hev b8. In 10 (72%) patients with sensitization to the Phleum pratense antigen Phl p 12 is diagnosed sensitization to Hev b8. Pollen sensitization was more often observed in the age group from 6 to 18 years old. Food sensitization is more in children under 5 years old. In 48% of patients from the entire surveyed group, sensitization to the antigen of soy Gly m 5 was detected. The number of specific immunoglobulins averaged 0.53 and shows the average level of sensitization to soy. 44% of sensitization was observed in the age group of 6-18 years.

Results and discussion:

Based on the results obtained, the following conclusions were drawn:

1. In patients with an indicator of the level of total immunoglobulin E above 100, polyvalent and cross-allergic sensitization is more common. With an indicator below 20, 5% of patients did not experience sensitization. Patients with low sensitization are diagnosed with acute urticaria, acute obstructive bronchitis with an allergic component.
2. In patients aged 6-18 years, pollen sensitization is more often diagnosed, in children under 5 years old – food sensitization. In adult patients food allergies are practically not diagnosed.
3. Pollen sensitization was diagnosed in most of the patients examined and was observed mainly in the group from 6-18 years old.
4. In the studied pollen sensitization is diagnosed on the pollen of Phleum pratense, Salsola and Chenopodium album. The results showed cross-sensitization on the allergen of melon and date palms.
5. Pollen sensitization is determined in patients diagnosed with bronchial asthma and allergic rhinitis.
6. In plants the structure of Profilin antigens and the sequence of amino acids in 70-85% of cases are similar. The subjects have a high degree of sensitization to the Profilin protein.
7. Half of the subjects discovered sensitization to the Gly m 5 major allergen soy and are slightly diagnosed.
8. In 1/3 of the investigated, sensitization to the major antigen Act d 2 kiwi is diagnosed. In the literature, the antigen of kiwi Act d 2 is similar to soy, peanuts, as also shown in our study.
9. Allergy to seafood in the subjects was rarely observed, in 4 patients slight sensitization to oyster was detected.
10. Bos d 4 cow's milk antigen accounts for 5% of milk proteins and is considered the main major allergen. In 4 of the subjects, sensitization to Bos d 4 was found, all of them were under the age of 5 years.
11. Of pets, high sensitization is diagnosed on a cat (Fel d 1) and dog (Can f_Fd1). Fel d 1 allergen is a major cat antigen and is found on the skin and saliva composition. 50% of patients who are sensitized to an allergen Fel d 1 are diagnosed with allergic rhinitis, 28% have bronchial asthma, and 9% have acute bronchitis with bronchial hyperreactivity, and 14% have atopic dermatitis. Sensitization to this allergen was observed in 41% of cases and is observed mainly in the group from 6-18 years.
12. Fungal allergen - Alt a 1 sensitization is diagnosed in 10% of patients examined. More often diagnosed with the age group of 6-18 years and amounted to 60%.

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