

ANALYSIS OF THE POSITIVITY RATE IN IGE POSITIVE PATIENTS TO FOOD ALLERGENS IN VERONA HOSPITAL LABORATORY DURING 2003

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SUMMARY:

Background: It has been known for some time now that reactions to allergens, not only those inhaled but also those in food, varies with age in atopical patients.

Objective: To evaluate the specific IgE positivity percentage in order to improve laboratory diagnosis in subjects with suspected food allergy.

Methods: The positivity percentages of specific IgE were analysed (UniCAP100-Pharmacia) taking into consideration the two age brackets of below and above 12 years.

The below 12 years age bracket was then further divided into pre-school age (3-5 years) and school age (6-12 years).

Results: By measuring the simple positivity percentage for specific IgE to food allergens, there is a clear decrease as the child matures in reactions to milk and eggs and an increase towards food IgEs that cross-react with grass and tree pollens or other inhaled allergens like moulds and mites.

Conclusion: It will be necessary in the future to have the diagnostic means to identify this cross-reaction problem by using recombinant allergens that can demonstrate the combined reaction between inhaled and food allergens.

Key-words: Specific IgE - Food - Age.

INTRODUCTION

To improve the diagnostic ability of our laboratory in terms of food allergy illnesses, food allergy panels were examined for specific IgE dosage and considered as positive when over 0.35 KU/l. The food allergy analysis patients examined in our laboratory were divided into three age brackets in consideration of the different diets patterns of the various times of life (1, 2). The age brackets were: zero to 2 years, 3-12 and adult (considered as such in regard of the diet once 12 has been reached) (3,4).

The choice of foods to study for positivity percentage followed three rules:

The rule of frequency to positivity: these foods were taken from literature (e.g. milk, eggs) and the type of food more frequently used in a normal diet, like banana for small children or the introduction of foods like pork, dried fruits (hazelnut) and peach in pre-school and school age.

In adults (those above 12 years of age where the diet is practically free) other foods were introduced such as prawns (to represent crustaceans) and fruit like kiwi.

The rule of seriousness of the allergic symptoms (peanuts, soya, hazelnut, cod) that an allergen may provoke, even if rare (5).

The signal function due to differential diagnosis characteristics (gluten, anisakis) or to cross-reaction with inhaled allergens like apple and birch, hazelnut fruit and tree; wheat, maize, rice, tomato, carrot, celery, parsley with grasses or composites; yeast and moulds, as well as chicken for possible cross-reaction with eggs, and beef with milk and its proteins. Crustaceans can cross-react with dermatophagoides and kiwi cross-reacts with latex. Other allergens are considered as representatives of a family such as pear and peach for rosaceans or peas for pulses, potatoes for solanaceans and prawns for crustaceans (table1) (6, 7).

MATERIALS AND METHODS

The dosage method of the specific IgEs is fluorimetric and carried out with the UniCap100 instrument (PHARMACIA)

The specific IgE dosages were evaluated over a whole year from January to December 2003.

The PHARMACIA MasterCap statistical programme was used to highlight the age brackets and the IgE positivity for each allergen.

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The result was considered positive for IgE values of more than 0,35 KU/L.

The age brackets analysed in 2003 were above and below 12 years.

In the 2003 analysis, together with the positivity of patients above 12, the under 12 group was further divided into 0 to 2 and 3 to 12, and this latter group was even further divided into 3 - 5 (pre-school) and 6-12 (school) years.

RESULTS

The data shows that during the first period of life (table 2) there is a net IgE positivity (>10%) for milk (f2) and eggs (f1).

Later, in the age period between 3 and 12, specific IgEs are found also for foods like peanuts (f13) and those foods that show a cross reaction with IgEs of grass pollens like cereals, composites and trees, such as birches and corilaceae, particularly for grasses: wheat (f4, f79), carrot (f31), potato (f35), and trees: apple (f49), peach (f95) and hazelnut (f17) (table 3).

If the positivity frequency is evaluated by subdividing the under 12 age group into pre-school (3-5) and school (6-12) ages, it can be noted that it is exactly during this period that reaction to milk (f2) and eggs (f1) declines and reaction to all those foods like pulses (f13, f14, f12) and foods that cross-react with inhaled allergens from mould for yeast (f45) to vegetables (f25, f31, f35) and fruit (f17, f49, f95) that cross-react with grass pollens and trees (tables 4-5) increase.

In the adult age bracket, the positivity percentage for milk (f2) and eggs (f1) decreases considerably (Table 6) while positivity is still higher than 10% for peanuts (f13) and soya (f14). Moreover, reaction to foods that have cross-reactions with grass pollens like cereals and composites is even more evident. This may be suspected in the positivity to wheat (f4), rice (f9), carrot (f31), but also tomato (f25), potato (f31) and parsley (f86). While the cross-reaction to tree pollens is highlighted in the positivity to apple (f49) and hazelnut (f17). In adults there is also an evident reaction to crustaceans represented by prawns (f24) (their possible cross-reaction with mites is not to be excluded).

Allergen code	Allergen Pt age 0-2 years	Allergen code	Allergen Pt age 3-12 years	Allergen code	Allergen Pt age > 12 years
F1	Albumen	F1		F1	
F75	Yolk	F75		F75	
F2	Milk	F2		F2	
F76	Alfa- lactoalb	F76		F24	Prawn
F77	Beta-lactoglob,	F77		P4	Anisakis
F78	Casein	F78		F84	Kiwi
F4	Cereals	F4		F4	
F8	Maize	F17	Hazelnut	F17	Hazelnut
F9	Rice	F9		F9	
F79	Gluten	F79		F86	Parsley
F45	Yeast	F45		F45	
F13	Peanut	F13		F13	
F14	Soya beans	F14		F14	
F12	Peas	F12		F12	
F25	Tomato	F25		F25	
F31	Carrot	F31		F31	
F35	Potato	F35		F35	
F85	Celery	F26	Pork	F26	Pork
F49	Apple	F49		F49	
F92	Banana	F95	Peach	F95	Peach
F94	Pear	F94		F94	
F83	Chicken	F83		F83	
F27	Beef	F27		F27	
F3	Cod	F3		F3	

Table 1: List of 24 allergens considered in the three age brackets:

allergen	N° test	IgE > 0.35 Ku/l	% positive reactions
F1	103	19	19
F75	94	0	0
F2	104	22	21
F76	93	11	11
F77	93	9	10
F78	92	10	11
F4	98	7	7
F8	25	2	8
F9	27	1	4
F79	99	3	3
F45	25	0	0
F13	97	2	2
F14	90	8	9
F25	27	1	4
F31	45	2	4
F35	24	1	4
F85	24	0	0
F49	90	1	0
F92	25	2	8
F83	23	0	0
F27	26	2	8
F3	98	0	0

Table 2: Statistical analysis of specific IgEs for foods in patients between 0-2 years of age in 2003.

allergen	N° test	IgE > 0.35 Ku/l	% positive reactions
F1	186	29	16
F75	180	3	2
F2	186	29	16
F76	170	11	7
F77	168	12	7
F78	166	11	7
F4	175	28	16
F79	164	5	3
F9	52	3	6
F45	42	2	5
F13	179	23	13
F14	171	14	8
F17	39	5	13
F12	42	3	7
F25	57	5	9
F31	52	6	12
F35	42	5	12
F49	170	18	11
F95	36	4	11
F83	42	1	2
F26	37	0	0
F27	44	2	5
F3	179	2	1

Table 3: Statistical analysis of specific IgEs for foods in patients between 3-12 years of age in 2003.

allergen	N° test	IgE > 0.35 Ku/l	% positive reactions
F1	88	19	22
F75	84	1	1
F2	85	16	19
F76	80	5	6
F77	79	4	5
F78	77	8	8
F4	80	5	6
F79	77	0	0
F9	24	1	4
F45	23	0	0
F13	82	7	9
F14	77	3	4
F17	20	2	10
F12	22	1	5
F25	28	1	4
F31	24	1	4
F35	22	1	5
F49	78	5	6
F95	18	1	6
F83	24	0	0
F26	18	0	0
F27	24	1	4
F3	83	0	0

Table 4: Statistical analysis of specific IgEs for foods in patients between 3-5 years of age in 2003.

allergen	N° test	IgE > 0.35 Ku/l	% positive reactions
F1	98	10	10
F75	96	2	2
F2	101	13	13
F76	90	6	7
F77	89	4	4
F78	89	7	9
F4	95	23	24
F79	87	5	6
F9	28	2	7
F45	19	2	10
F13	97	16	16
F14	94	11	12
F17	19	3	16
F12	20	2	10
F25	29	4	14
F31	28	5	18
F35	20	4	20
F49	92	13	14
F95	18	3	17
F83	18	1	5
F26	19	0	0
F27	20	1	5
F3	96	2	2

Table 5: Statistical analysis of specific IgEs for foods in patients between 6-12 years of age in 2003.

DISCUSSION

From the positivity percentage study for specific IgEs >0.35 KU/D and in reference to each age group considered, there is a decrease in the positivity percentage for milk (f2) and correlated allergens (f76, f77, f78, f27), and eggs (f1) and correlated allergens (f75, f83), which occurs gradually as the subject approaches and passes the age of 12 (fig.1). By further dividing the age period from 3-12 years into two groups, pre-school (3-5) and school (6-12), it can be seen that reaction to eggs (f1) decreases exactly during this age group while reaction to milk (f2) shows a progressive decrease (fig. 2).

As for positivity to foods that cross-react with grasses (cereals, composites and moulds) (f79, f4, f9, f25, f31, f35, f45), there is an increase in reaction as the subject gradually approaches the age of 12 (fig. 3). By subdividing the 3-12-year age group into pre-school and school periods, it is clear that this considerable increase occurs exactly during this passage into the school age (fig. 4).

Reaction to foods belonging to the pulse group (f12, f13, f14) and to fruits that cross-react with tree pollens like

allergen	N° test	IgE > 0.35 Ku/l	% positive reactions
F1	706	33	5
F75	702	22	3
F2	718	54	8
F4	713	136	19
F9	673	96	14
F45	190	8	4
F13	706	117	17
F14	699	95	16
F17	184	20	11
F12	180	12	7
F25	691	116	17
F31	666	107	16
F35	191	20	11
F86	174	28	16
F49	694	100	14
F84	189	12	6
F95	189	15	8
F83	165	2	1
F26	130	1	1
F27	179	5	3
F24	190	20	11
P4	188	11	6
F3	718	23	3

Table 6: Statistical analysis of specific IgEs for foods in patients over 12 years of age.

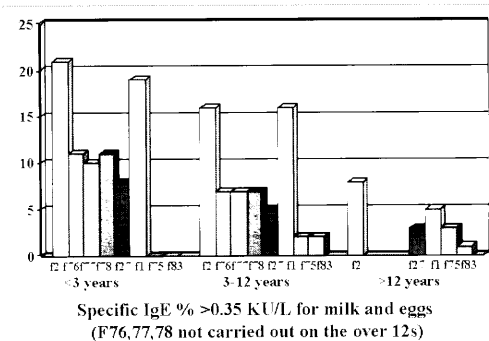


Figure 1.

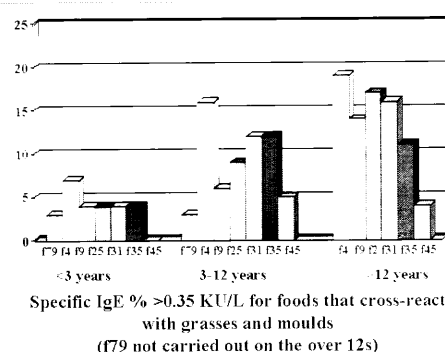


Figure 3.

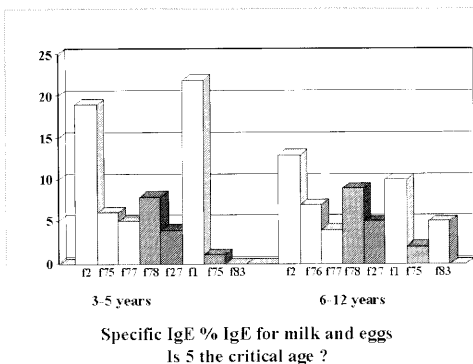


Figure 2.

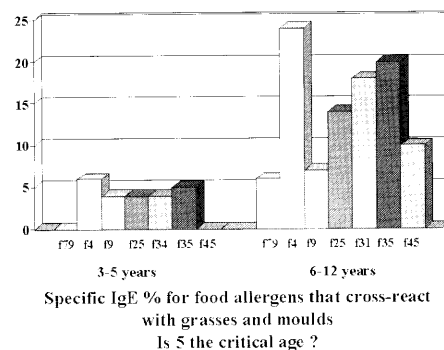


Figure 4.

birch and hazelnut (f49,f95,f17) increases with age (Fig. 5) and again the critical passage is school age (Fig. 6). It seems clear that reaction to fish (f3) and crustaceans (f24,) as well as parasites like anisakis (p4) is characteristic of the adult age (Fig. 7), even if, for these two allergens cross reaction should always be considered possible with mites and between themselves.

CONCLUSIONS

The study of positivity percentages with statistical systems connected to the analysers leads to a more profound study of the progress of average IgE allergic reactions, including food allergens, among the population of the surrounding geographical area and according to the various age brackets (3). The analytical accuracy achieved, quantification of IgE dosages can explain the allergic pathology of patients but the diagnosis of food allergies and the interpretation of analytical data must be carried out in conjunction with the patient's clinical history (4, 8).

In order to improve the connection between the clinical picture and test tube diagnostics in the future, it seems increasingly evident that the combined reaction between inhaled and food allergens should be

determined by finding the specific IgEs for recombinant allergens (9, 10).

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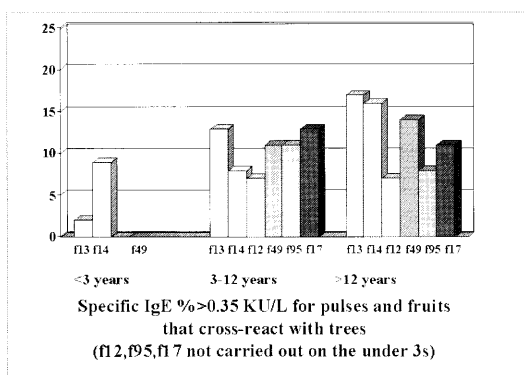


Figure 5.

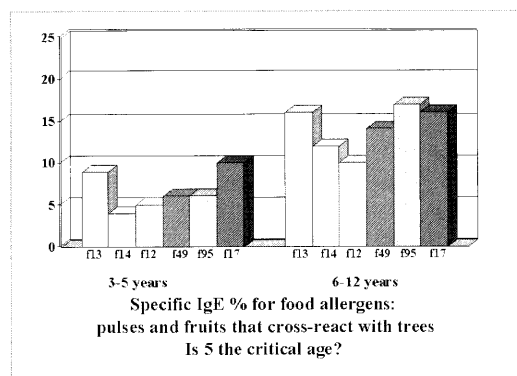


Figure 6.

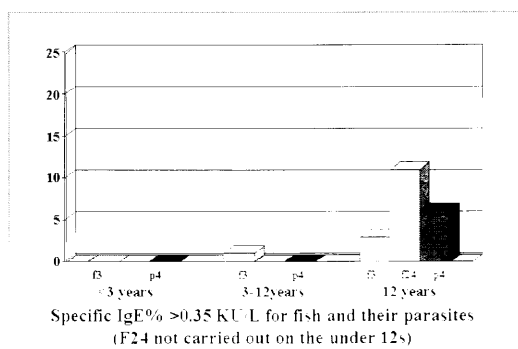


Figure 7.