

## HISTORY OF FOOD ALLERGY, RAST AND CHALLENGE TEST IN ATOPIC DERMATITIS

E. Bonifazi, L. Garofalo, A. Monterisi and C. L. Meneghini

*Department of Dermatology, University of Bari, Bari, Italy*

**Abstract.** In 541 patients with atopic dermatitis (AD), a history with special reference to food allergy, RAST and challenge tests were performed. In 84 patients cutaneous symptoms (exacerbation of the dermatitis or acute urticaria) were attributed to ingestion of various foods, especially eggs, milk, fish and peaches. While in cases of acute urticaria the history agreed largely with the results of the RAST and challenge test, in patients with exacerbation of the dermatitis, considerable discrepancies came to light between the anamnestic data and the other tests. Therefore the essential role of food allergy, in a consistent number of cases of atopic dermatitis, is unlikely. In the subjects with a family history of atopy, the early introduction of artificial milk neither increases the incidence of atopic dermatitis, nor precipitates its earlier onset, nor—finally—increases the incidence of asthma or food allergy. Only 3 out of 25 subjects with specific IgE antibodies to nuts showed specific IgE to birch, which is an uncommon tree in the South of Italy.

**Key words:** Dermatitis; Atopic; Food allergy; RAST

Atopic dermatitis (AD) is a most complex condition in whose pathogenesis, which has not yet been fully elucidated, genetic, environmental and immunological factors play an important role.

The aim of this paper is to elucidate the etiopathogenetic significance of food allergy in AD, with special reference to the type of feeding in early infancy.

### MATERIAL AND METHODS

541 subjects with AD who came under our care in the last 5 years were admitted to the study. A majority of the subjects, namely 503 (248 males), were under 12 years of age and 38 (11 males) were 13 to 44 years of age. In addition our series included 80 controls aged 1 to 12 years and 12 controls aged 13 to 50 years, all suffering from other diseases and with neither personal nor family history of atopy.

In all these subjects a detailed allergological history was obtained with special reference to the possible cutaneous manifestations of food allergy. Furthermore, in 6 000 children who came under our care in the last 18 months, a special inquiry was undertaken into the family history (parents, children, brothers) of atopy (AD, asthma, rhinitis) and into the type of feeding in the first 3 months of life.

Specific IgE antibodies to white of egg, milk, and

**Table I.** *Clinical history: cutaneous symptoms elicited by the most allergenic foods*

	Number of patients with	
	Urticaria	Eczematous lesions
Egg	15	24
Milk	2	14
Peaches	14	2
Fish	12	2

fish (cod) were measured by radioimmunoassay, using the kit Phadebas-RAST (Pharmacia, Uppsala). In a further 84 subjects antibodies were measured to nuts and almonds. In 25 subjects with antibodies to nuts, RAST was carried out with three allergens. The results were expressed on an arbitrary scale from 0 (negative) to 4 (1, 2, 3, 4 positive) as previously described (3).

In all these subjects challenge tests were carried out. In those subjects already put on a diet excluding certain foodstuffs, challenge tests were carried out under double-blind conditions. Others were first put on a diet free from the offending foodstuff or foodstuffs for 30 days and then challenge tests were carried out, starting with very small doses and increasing the latter progressively by repeated administration over a period of at least one week. In cases of doubtful results, the tests were repeated in various seasons, sometimes using the double-blind technique.

### RESULTS

**History.** Among the 541 subjects with AD, cutaneous symptoms after ingestion of eggs, milk, peaches and

**Table II.** *Atopic diseases in 222 subjects with family history of atopy*

	Breastfed (150)	Bottlefed (72)
Atopic dermatitis (AD)	88 59% <sup>a</sup>	23 32% <sup>a</sup>
Onset of AD (mean age)	18 months	20 months
AD + asthma	24 27% <sup>b</sup>	4 17% <sup>b</sup>
AD + food allergy	22 25% <sup>b</sup>	3 13% <sup>b</sup>

<sup>a</sup> Of the total cases. <sup>b</sup> Of the cases with AD.

Table III. Results of RAST and clinical history (cases with RAST positive/total cases)

	Food allergy		No food allergy
	Urticaria	Eczem. lesions	
Egg	14/15	18/24 (2)	135/502 (76)
Milk	2/2	8/14	96/525 (57)
Fish	11/12	1/2	32/528 (14)

( ) = RAST class 1

fish were reported in 85 cases. Other foods were responsible for cutaneous symptoms in 24 cases. Details of symptoms associated with the most offending foods are shown in Table I. No instance of food allergy was recorded in 92 non-atopic patients.

Inquiry into the type of feeding in infancy allowed us to single out, among the subjects at risk—222 patients with a family history of atopy—2 quite distinct populations: 1) babies exclusively breastfed for at least 3 months; 2) those on bottle feeding from day 1. The results are listed in Table II.

*RAST.* Results of RAST with egg, milk and fish are presented in Table III. In 3/25 subjects with antibodies to nuts, antibodies to birch were also demonstrated. In 15 of these 25 cases antibodies to juniper (in 4 patients), to oak (in 13 patients), and to plane-trees (in 12 patients) were also shown, (Table IV).

Table IV. Antibodies to trees in 15 subjects with antibodies to nuts (figures indicate RAST class)

	Betula	Juni-perus	Quercus	Olea	Platanus
1. C. M.	2	1	2	0	2
2. J. A.	0	0	0	0	0
3. D. S.	0	0	3	2	0
4. O. M.	0	1	2	1	2
5. P. A.	0	0	0	0	0
6. L. A.	0	0	2	0	2
7. Z. R.	1	2	2	2	2
8. F. M.	0	0	2	2	2
9. D. G.	0	0	2	0	1
10. C. G.	0	0	2	1	2
11. M. D.	0	0	2	0	2
12. R. M.	2	0	2	2	2
13. V. M.	0	1	2	3	2
14. M. A.	0	0	1	0	2
15. N. G.	0		2	0	2

Table V. Egg sensitivity in atopic dermatitis (AD): Clinical data, RAST and challenge test (CT)

	RAST class				
	0	1	2	3	4
In 15 cases of AD + egg urticaria	1		9 (6)	1 (1)	4 (4)
In 24 cases of AD + egg exacerbation	6	2 -1-	7 -2-	3 -2-	6 -3-
In 502 cases of AD without food allergy	367	76	48 -2-	10 -3-	1
In 92 controls without AD	90	2			

( ) = number of patients with CT positive: urticaria. - - = number of patients with CT positive: exacerbation AD.

*Challenge test.* In patients reporting a history of acute manifestations (urticaria, angioedema, rash) the results of challenge tests proved positive in 34/43 cases. In patients with a history of exacerbation of the dermatitis, elimination diets and challenge tests were positive in 13/42 cases. In patients with positive RAST and negative clinical history, elimination diets and challenge tests were positive in 5/253 cases.

## DISCUSSION

Introduction of heterogeneous proteins in the first months of life may, in some cases, render a latent atopic constitution more evident. However, in a majority of our subjects at risk of atopy, early introduction of artificial cow's milk neither increased the incidence of AD, nor precipitated its earlier onset, nor—finally—increased the incidence of asthma and food allergy. On the contrary the data presented in Table II indicate a surprising prevalence of atopic disorders in breastfed babies. These data are in agreement with those of Halpern (5), who followed for 7 years 1 753 children fed breast milk, soy milk, or cow's milk: the development of allergy was similar in all three groups.

Recently Björkstén & Saarinen (2) were able to detect cow's milk antibodies only in breast-fed children. They suggested that large quantities of antigen, such as in children fed cow's milk, may inhibit the IgE response.

The foods reported more frequently as allergenic in our series were eggs, milk, fish and peaches. The cutaneous response developing after ingestion of eggs was either acute (urticaria) or eczematous in

type. That recorded after ingestion of milk was usually of the latter variety and that after fish and peaches consisted mainly of acute manifestations.

The most common acute pattern was an attack of urticaria, usually of the "contact type". The onset was immediate after contact with a raw white of egg, with fish and with the skin of peaches.

The picture of eczematous type took longer to develop and the time lag was more variable (6-72 hours).

The age was of considerable importance. Cutaneous reactions occurred mostly in the first 10 years of life, only to become attenuated and often disappear altogether later, while AD, might still persist.

Acute reactions of food allergy were more frequently demonstrated in our patients with AD and respiratory allergy. Some authors (1,4) pointed out the association between respiratory allergy and food sensitivity. One possible explanation was cross-sensitivity between birch pollen and hazel-nut allergen, but in our series, antibodies to nuts were more frequently associated with antibodies to oak and plane-trees. By contrast, antibodies to birch and juniper, which are rare trees in our country, were seldom demonstrated.

In our previous paper (3) the role of the most common food allergens in the etiopathogenesis of AD was investigated. Antibodies to foods can be frequently demonstrated in AD patients, but they are not always responsible for exacerbation of dermatitis. This is especially evident in the case of antibodies to eggs. The data presented in Table IV show that these antibodies can be found in 1/3 of AD cases (167/541), but they were responsible for eczematous lesions in only 13 cases (2.4%), confirmed by double-blind challenge tests. It would appear therefore that food allergy may constitute

a factor responsible for eczematous lesions in some cases of AD, but its essential role in a significant group of cases is unlikely.

#### ACKNOWLEDGEMENT

This study was supported by Consiglio Nazionale delle Ricerche, Rome.

#### REFERENCES

1. Belin, L.: Immunological analyses of birch pollen antigens, with special reference to the allergenic components. *Int Arch Allergy Appl Immunol* 42: 300, 1972.
2. Björkstén, F. & Saarinen, U. M.: IgE antibodies to cow's milk in infants breast milk and milk formulae. *Lancet* ii: 624, 1978.
3. Bonifazi, E., Garofalo, L., Monterisi, A. & Meneghini, C. L.: Food allergy and atopic dermatitis: experimental observations. *Acta Dermatovener (Stockh)* 58: 349, 1978.
4. Eriksson, N. E.: Food sensitivity reported by patients with asthma and hay fever. *Allergy* 33: 189, 1978.
5. Halpern, S. R., Sellars, W. A., Johnson, R. B., Anderson, D. W., Saperstein, S. & Reisch, J. S.: Development of childhood allergy in infants fed breast, soy or cow milk. *J Allergy Clin Immunol* 51: 139, 1973.

#### DISCUSSION

*Larsen (Aarhus)*. Q: In the cow's milk group and the breast-fed group, how many patients in the two groups had a double parental history of atopy?

A: We did not make this differentiation.

*Rajka (Oslo)*. Q: Have you seen itch as the first sign in your challenge experiment?

A: Yes, itch is a very important symptom which we find in acute reactions such as urticaria and in eczematous flares and exacerbations of the dermatitis. In the acute reaction pruritus begins a few minutes after challenge. In eczematous lesions, pruritus began between 6 and 72 hours after challenge.