

RESULTS OF FOOD TESTING IN ATOPIC DERMATITIS

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Abstract. Skin testing to find food allergy in atopic dermatitis is recommended from the age of 4 months up to early adulthood. Scratch, scratch-chamber, prick and intracutaneous tests may be used. In order to obtain optimal benefit from skin testing, both commercial extracts and fresh foodstuffs must be used. Extracts of protein-rich foods, such as fish, egg and nuts, work very well in skin tests, but fruits and vegetables lose their allergenicity easily in the extraction process and that is why they are tested in raw state. The younger the patient the better the correlation between the skin test results and the challenge tests. The nature of the allergen also has a great influence on the clinical relevancy of the skin tests. Extracts of various cereals correlate for example in almost every case with skin reactivity alone and not with symptoms from ingested cereals.

Key words: Skin testing; Atopic dermatitis; Food allergy; Immediate hypersensitivity

In the thirties and forties food testing was popular in many countries. In the fifties and sixties it played only a minor part in routine testing for detecting allergens responsible for flare-ups in atopic dermatitis. This decade has seen the revival of skin tests, antigen-avoidance diets, peroral challenge tests and hypoallergenic food regimens in the diagnosis and management of atopic disorders. Laboratory tests have been developed for detecting allergens, to purify them and to detect specific IgE antibodies in the sera of the allergic patients. Some dermatologists and pediatricians use skin tests as a screen for food allergies, while others rely neither on skin tests nor on RAST-test results.

In this paper I shall discuss our observations concerning the usefulness of scratch, prick and intracutaneous tests and the clinical relevancy of the test results.

SYMPTOMS AND SIGNS OF FOOD ALLERGY (Table I)

Widespread dermatitis with sudden flare-ups, eczema on the eyelids and perioral area and oedema in the lips, oral mucosa and eyelids are clues to food hypersensitivity. Allergic rhinitis, asthma, conjunctivitis and gastrointestinal disorders

may also accompany other signs and sometimes they are the only symptoms of this type of allergy.

Contact urticaria from foodstuffs is nearly always due to immediate hypersensitivity, and in most cases local symptoms in mouth and nasopharynx and/or aches and pains in the stomach are noticed (5).

ALLERGENS SUITABLE FOR SKIN TESTING (Table II)

Kjell Aas (1, 2) has studied cod fish allergy and been able to demonstrate the proteins responsible for the reaction. In fact, the results of skin tests with fish extracts as well as extracts from egg, peanut and other nuts often agree closely with the patient histories and peroral challenge tests (7). On the other hand, several fruits, vegetables and edible roots lose their allergenicity very easily in cooking, deep-freezing and juice-making (5, 9). Spices can also be tested as such, but extracts for prick and intracutaneous testing can also be made. Meat, liver and other protein-rich foods are suitable for scratch testing, and commercial extracts are also available. Allergy to meat, however, is so rare that these allergens are needed in sporadic cases only.

The difficulties in producing a proper test substance for skin testing are very pronounced in cereals. A positive skin test usually means nothing more than cutaneous allergy (10). In such cases, cereals do not elicit any signs of hypersensitivity when the patient eats bread or porridge. We rarely find exceptions to this rule. Young children may show a positive correlation between the skin test result and peroral challenge in rice and corn hypersensitivity. In buckwheat allergy a skin test is also relevant in adult patients. Extracts

Table I. *Symptoms and signs suggesting food allergy in atopic dermatitis*

Symptoms and signs	Foods usually responsible
Periorbital and perioral dermatitis	Fruits and vegetables (apples, carrots, etc.). Spices
Sudden aggravation of the dermatitis elsewhere	Egg, milk, cereals
Itching and edema on lips, tongue and in throat with or without rhinitis and conjunctivitis	Fruits, vegetables, peas, soybean
Urticarial rashes	Plum, spices

Table II. *Food testing in atopic dermatitis*

SC=scratch chamber test, P=prick test, I=intracutaneous test, S=scratch test

Allergen(s)		Skin test method	Relevancy	Remarks
Fish	Commercial extract	P I	Excellent	One of the most important allergens throughout life
Egg	Commercial extract As such	P I S	Good	Hypersensitivity gradually wanes
Milk	Commercial extract As such	P I S	Good in babies	Hypersensitivity usually disappears between 1 and 2 years
Nuts	Commercial extract	P I	Good	Cross allergy to birch pollen in 90-100%
Peas	Commercial extract	P I	Good in babies	Hypersensitivity gradually wanes
Soybean	As such (ground)	S		
Spices	As such Extracts	S SC P I	Variable	False-positive skin test reactions occur
Carrot	As such	S SC	Good	False-positive and false-negative reactions occur. Cross allergy to birch pollen
Swede	As such			
Plum	As such	S SC	Good	Group allergy between the fruits. Cross allergy to birch pollen
Pear				
Apple				
Peach				
Celery	As subc Extract	S SC P	Good	Severe test reactions may occur. Does not lose its allergenicity by cooking. Cross allergy to birch pollen
Potato	As such	S SC	Good	Loses its allergenicity by cooking
Paprika	Extract As such	P I S	Moderate	False-positive reactions occur
Meat	As such	S SC	Poor	False-negative reactions
Liver	As such	S SC	Poor	A positive reaction suggests cutaneous sensitivity
Kidney	As such			
Cereals	As such (flour) Extracts	S P I	Poor in adults moderate in babies	Positive reactions in cutaneous allergy only in adults
Buckwheat	As such Extract	S P I	Good	Large test reactions may occur

from cereals may be used for prick and intracutaneous tests, but flours in scratch tests as such also elicit positive reactions nearly as often as the extracts.

METHODS FOR SKIN TESTING

Prick and intracutaneous tests are suitable for most extracts which have been sterilized and which are pyrogen-free. A scratch test is the method used for most of the fresh vegetables and fruits, for natural spices and flours as well as for meat. The scratch-chamber test can also be used especially in testing apple, carrot, potato and other allergens that are easily destroyed (5, 6). In this test a small amount of crushed test substance is placed in an ordinary epicutaneous test chamber (Finn Chamber®, Epitest Ltd Oy, Helsinki) and fixed on the skin of the patient's back for 15-20 minutes. Then the test material is removed and the results recorded. A positive response is a wheal and flare reaction, at least

half the size of the reaction produced by histamine 10 mg/ml.

Allergic contact urticaria is sometimes also seen on intact skin and more easily on diseased skin (8). This type of testing is indicated, however, especially when looking for causes of type I contact eczema, although a positive result is a clue to allergic symptoms from ingested foods as well (11, 12).

PATIENT'S AGE

Usually it has been said that only children of 4 and upwards are old enough for skin testing with foods. In our experience, younger children can also be tested. Babies from 4 to 12 months of age are calm and do not become angry and cry when small scratches are made on their backs. It seems that at this age the test results are clinically highly relevant and irritant reactions are very seldom seen (Table III). Among the most common allergens only tomato, rye, barley and mustard can produce non-specific irritant

Table III. Food allergy in atopic dermatitis. Results of skin testing

Foodstuffs	Patients							
	4-12 months 7 pats		> 12-36 months 21 pats		Over 36 months 54 pats		Total 82 pats	
	++	+++	++	+++	++	+++	++	+++
	(relevant) ^a							
	No.	No.	No.	No.	No.	No.	No.	No.
Milk (Bencard)	2 (2)		3 (1)		3 (0)	2 (0)	8 (3)	2 (0)
Egg (Bencard)	3 (3)		2 (2)		1 (1)	2 (0)	6 (6)	2 (0)
Fish (Bencard)	1 (1)		3 (2)	1 (1)	4 (2)		8 (5)	1 (1)
Spices as such			2 (2)		9 (4)	10 (0)	11 (6)	10 (0)
Cereals as such								
Rice as such		1 (1)			1 (1)			
Rice as such			1 (1)				1 (1)	
Corn as such								
Pea as such		1 (0)	1 (0)		7 (2)		8 (2)	1 (0)
Soy bean as such					4 (1)		4 (1)	
Potato as such			1 (0)		7 (3)	1 (0)	8 (3)	1 (0)
Carrot as such		1 (0)		1 (0)	10 (5)	3 (1)	10 (5)	5 (1)
Apple as such	1 (0)				11 (8)	1 (0)	12 (8)	1 (0)
Tomato as such					7 (1)	3 (0)	7 (1)	3 (0)
Negative to all	3 pats		8 pats		24 pats		35 pats	
False-negative results to	banana		egg, fish, wheat, pea		Apple 2, wheat 2			

^a Patient history or challenge test positive.

reactions. Children between 1 and 4 years of age may be so worried about testing that it is impossible to perform any kind of skin test on them. At that age the correlation between skin test results and challenge tests declines.

Foods causing allergic symptoms in older children and young adults differ greatly from those in younger children. In babies, milk and egg allergies are common. Milk allergy usually disappears during the second year of life and hypersensitivity to egg diminishes to a great extent at 10-20 years. New allergens become important: apple, carrot, swede and various spices. On the other hand, allergy to pea, soybean and cereals may remain unchanged for years. Persons allergic to birch pollen are often hypersensitive to fruits and vegetables (3, 5). True cross allergy between birch pollen and apple has been demonstrated (4), and such a cross allergy obviously exists also between birch pollen and potato and carrot.

REFERENCES

1. Aas, K.: Studies of hypersensitivity to fish. A clinical study. *Int Arch Allergy* 29: 346, 1966.
2. Aas, K.: Studies of hypersensitivity to fish. Allergological and serological differentiation between various species of fish. *Int Arch Allergy* 30: 257, 1966.
3. Andersen, K. E. & Lowenstein, H.: An investigation of the possible immunological relationship between allergen extracts from birch pollen, hazelnut, potato and apple. *Contact Dermatitis* 4: 73, 1978.
4. Björkstén, F., Lahti, A. & Hannuksela, M., unpublished data.
5. Hannuksela, M. & Lahti, A.: Immediate reactions to fruits and vegetables. *Contact Dermatitis* 3: 79, 1977.
6. Lahti, A. & Hannuksela, M.: Hypersensitivity to apple and carrot can be reliably detected with fresh material. *Allergy* 33: 143, 1978.
7. May, C. D. & Block, S. A.: A modern clinical approach to food hypersensitivity. *Allergy* 33: 166, 1978.
8. Odom, R. B. & Maibach, H. I.: Contact urticaria: a different contact dermatitis. In *Dermatotoxicology and Pharmacology* (ed. F. N. Marzulli & H. I. Maibach). Hemisphere Publishing Corporation, Washington and London, 1977.
9. Pearson, R. S. B.: Potato sensitivity, an occupational allergy in housewives. *Acta Allergol (Kbh)* 21: 507, 1966.
10. Rowe, A. H. & Rowe, A., Jr: Food Allergy. Its Manifestations and Control and the Elimination Diets, 1st ed., pp. 23-40 and 534-593. Charles C. Thomas, Springfield, 1972.
11. Tuft, L. & Blumstein, G. I.: Studies in food allergy. II. Sensitization to fresh fruits: Clinical and experimental observations. *J Allergy* 13: 574, 1942.
12. Vaughan, W. T.: Food allergens. A genetic classification, with results of group testing. *Allergy* 1: 385, 1930.

DISCUSSION

Hanfin (Portland). Q: The majority of my patients have facial involvement, but they are not all sensitive to foods. What are the subtle features that allowed you to distinguish and be suspicious of food allergy?

A: About 1/3 to 1/2 of patients with periorbital and perioral eczema are allergic to foods.

Atherton (London). Q: I must confess that I am not too convinced that there are any clinical signs which may enable us to distinguish between patients allergic to food or not.

Aoki (Osaka). Q: Do you make your extracts yourself or are they commercial extracts? We do not see many positive reactions in our department.

A: We use commercial extract of fish, milk and eggs and that is all.

Aas (Oslo). Q: When you say "relevant", do you mean in giving the patient eczematous flares when they eat it, or do you mean relevant as an allergen?

A: With relevant reactions I mean that the patient gets eczema—or sometimes urticaria (usually eczema).