Role of the elimination diet in adults with food allergy

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The aim of the study was to check whether, after a period of complete exclusion of the offending foods in adult subjects suffering from food allergy, these foods could subsequently be safely reintroduced into the diet. Patients with chronic urticaria and/or perennial rhinitis negative for secondary pathology or other allergies were subjected to a strict diagnostic protocol for food allergy. Briefly, out of a case list of 207 patients, we found 23 patients whose symptoms were clearly related, on open reintroduction, to at least one food. The really offending foods in these patients were subsequently identified by double-blind, placebo-controlled food challenges. Only 10 of the 23 patients had positive challenges for 13 foods. Double-blind challenges were repeated after 1 year or more of avoidance of the offending foods to evaluate the persistence or disappearance of sensitivity. We found that five (38%) of the 13 previously offending foods were well tolerated. Thus, in adults, as previously proved in children, dietary avoidance of the offending foods appears to be an effective measure for dealing with food allergy. The kind of foods involved and the completeness of their avoidance appeared to be important factors favoring the reestablishment of tolerance in adults. (J ALLERGY CLIN IMMUNOL 1989;84:475-83.)

Food allergy is primarily treated by dietary avoidance of the offending foods.[1-4] A major problem, however, is obtaining the patient's compliance because we cannot initially establish how long the food must be avoided. It is still not clear whether the dietary restriction results in recovery of tolerance to the offending food, so that it can later be reintroduced into the diet, or simply prevents the appearance of symptoms. In children, DBPCFCs in controlled prospective studies reported by Sampson[5,6] revealed that offending foods could be reintroduced in a good percentage of cases, without symptoms, after 1 to 2 years of dietary avoidance.

To our knowledge, no similar studies have yet been made in adults. This kind of study would be interesting because, since the etiologic factors and pathogenic mechanisms are probably different, it is reasonable to assume the natural history of food allergy in adults will be different from children.

Abbreviations used

SPT:	Skin prick test
OFR:	Open food reintroduction
DBPCFC:	Double blind, placebo-controlled food challenge
DBFC:	Double-blind food challenge
R:	Rhinitis
AE:	Angioedema
V:	Vomiting
UR:	Urticaria
D:	Diarrhea
AS:	Asthma
GI:	Gastrointestinal

The aim of the present study was to check the use of strict avoidance of offending foods in adults and the possibility of reintroducing these foods into their diet. We identified the offending foods by DBPCFCs in a group of adults with chronic allergic symptoms and checked the persistence or disappearance of symptoms by repeating the DBPCFCs after a period of diet.

PATIENTS AND METHODS

Patients

Initial evaluations were performed in adult patients suffering from chronic UR/AE (daily symptoms for at least 6 weeks) and/or perennial R, referred to the outpatient Department of Allergy of the First Department of Internal

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Medicine, University of Milan, Italy, between January 1985 and December 1986. Only patients in whom other known etiologies had been excluded were accepted for the study. We admitted patients suffering from perennial R with negative SPTs to common inhalants, no nasal polyps or any other nasal pathologies, and patients with UR/AE with no history of adverse reactions to drugs and negative tests indicative of physical (exercise or cold) UR or secondary (e.g., collagen vascular disease and parasitic or other infections) UR/AE syndrome. In addition to UR/AE or perennial R, some patients complained of bronchial AS or GI symptoms, such as V or D.

Schedule of the study

Dietary diagnostic procedures. This procedure consisted of three different steps:

1. *A 2-week run-in period with a normal diet.* During this period the patients made a daily assessment of their symptoms by filling in a diary card and reporting symptoms daily.

UR symptoms were the number of wheals and size score. The wheal size scores of 1, 2, or 3 were assigned on the basis of a rough evaluation of the largest diameter of the wheals as follows: 1, <2 cm; 2, 2 to 5 cm; 3, >5 cm; and the duration of itching (minutes).

R symptoms were the number of sneezes, number of disposable handkerchiefs used, and duration of nasal obstruction (minutes).

At the same time, we collected the history and performed SPTs and RAST for food allergens. Each patient was prick tested with a standard panel of 40 food extracts (Dome-Hollister-Stier, Miles, Ltd., Slough, England, 1:20 wt/vol) and 36 fresh foods (prick plus prick).[7] Histamine hydrochloride, 10 mg/ml, served as postive control, and a glycerine solution served as negative control.

A wheal at least 3 mm larger than the negative control wheal was considered positive. The reaction was read after 15 minutes and interpreted in relation to the size of the positive control wheal. A reaction equal to that produced by histamine was graded 3+; wheal twice its diameter, 4+; wheal half its diameter, 2+; and wheal a quarter the diameter, 1+.

RAST with commercially available material (Pharmacia, Ltd., Uppsala, Sweden) was performed for foods positive to SPT and, at the end of the dietary diagnostic procedure, for foods positive on OFR.

2. *A 3-week period of a restricted diet (consisting of rice, turkey, green salad, olive oil, peeled pears, tea, salt, sugar, and water).* During this period the patients continued to fill in the daily symptom score. An improvement of >80% in the symptom score during the restricted-diet period, compared to the run-in symptom score, was necessary for consideration of food intolerance and to schedule patients for OFR.

The 80% improvement in symptoms was determined mathematically, comparing mean values reported for each diary item during the run-in period and during the restricted diet (in regard to the number of wheals and size score, values to be compared were obtained by multiplying the number of wheals by the size score, i.e., 20 wheals about 3 cm in size [score 2], 20 × 2, 40; two wheals about 1.5 cm [score 1], 2).

3. *A group-by-group OFR into the diet.* Food groups, containing antigenically similar foods, were the following: (1) beef, veal, and pork meat, (2) egg and chicken, (3) cereals, (4) milk and dairy produce, (5) nuts and seeds, (6) fish, (7) fresh fruits and vegetables, (8) alcoholic drinks, and (9) preserved foods. Each food group was reintroduced into the restricted diet for 3 days at home, and the patients had to record the food groups causing symptoms and the time elapsed between food ingestion and onset of reaction. Incriminated food groups were withheld while new food groups were reintroduced. At the end of the OFR, the offending food groups were reintroduced again. If their positivity was confirmed, each food of the group was reintroduced individually. Foods thus identified were eliminated from the patient's diet until DBPCFCs were performed.

Starting with 207 patients with chronic symptoms, 75 demonstrated >80% improvement in symptoms after the diet. Only these patients continued to OFR and only 23 reacted clearly positive to one or more foods (Fig. 1). Positive foods were excluded from these patients' diet until DBPCFCs were done with the incriminated foods in capsules.

Preparation of foods. Foods to be tested were obtained from various sources: (1) freeze-dried forms from commercial sources (milk) or lyophilized in our laboratory (tomato, potato, garlic, egg white, egg yolk, and bean), (2) ground forms (peanut, almond, hazelnut, and walnut), and (3) powdered forms from commercial sources (rice, oats, whole wheat flour, and whole maize flour).

Lyophilization. An FDX-1-54 flexi-dry freeze dryer with an FDX-ML-12 manifold (FTS System, Stone Ridge, N.Y.) is used in our laboratory. Foods are cut into thin slices and then placed in a thin layer around the walls of a Multitainer flask (MT-1, FTS System). After "shell freezing" at −80° C, the Multitainer is connected to the device, excluding 11 valves. The time required for lyophilization varies depending on the water content of the foods and the environmental temperature. For example, tomatoes require 24 to 36 hours, and egg white, about 8 hours.

The allergenic activity of our lyophilized foods was checked by rehydrating them with normal saline and comparing the wheals of a skin prick test made with these foods with wheals made with the same foods in fresh form. Wheal diameters were always about the same before and after lyophilization.

The freeze-dried foods were then powdered with a common blender and placed in opaque dye-free jelly capsules, each containing 300 to 500 mg, depending on the weights of the foods (with the exception of garlic, for which particular doses were administered). Placebo (glucose or talc) was placed in identical capsules.

DBPCFC procedure

When DBPCFCs were performed, patients were receiving a diet free of all suspected foods and thus were almost asymptomatic. Any symptoms that arose were very mild and stable; therefore, they could be easily distinguished from

the patent symptoms elicited by the challenge. In any case, the symptom scores were similar each day a challenge was made (with either food or placebo).

On the days when DBPCFC was done, patients were taking no drugs, since they were almost asymptomatic. Patients were specifically advised not to take β_2-agonists in the 12 hours before the challenge.

The food challenge was performed in a hospital setting, under close medical control. In 1 day, either one food or placebo was tested. Challenges were made at intervals of at least 3 days, if results were negative, and at least 1 week, if results were positive. The initial dose of one capsule was doubled at 20-minute intervals, either until symptoms developed or a total cumulative dose of 15 gm had been administered. This cumulative dose was never exceeded when the test was negative. The patient was under observation for a total of 8 hours and was then provided with a diary card with scores for delayed reactions. If a delayed reaction occurred, the challenge was repeated, and the patient had to stay in hospital for an appropriate observation period.

Criteria of positivity

Challenges were scored as positive when at least one of the following occurred:

1. With UR or AE, we evaluated the objective appearance of wheals and erythema, with or without pruritus.
2. With R, we considered the appearance of nasal symptoms, such as sneezes and rhinorrhea, which were evaluated as reported above (see R symptoms) or nasal obstruction. Nasal obstruction was evaluated measuring nasal resistance by an anterior passive rhinomanometer, NART (PK Morgan, Ltd., Chatham, U.K.). Resistance values (to a flow of 3 L/min, delivered by the device) were calculated as the mean of five consecutive measurements in each nostril. Measurements were made at the beginning of the test (baseline conditions) and 5 and 15 minutes after each test dose.

An increase in nasal airway resistance of 500% of baseline conditions was scored as positive. However, since the test is not standardized, the challenges were considered as positive essentially on the basis of symptoms.

3. With bronchial AS, we evaluated the appearance of objective symptoms, such as wheezing, dyspnea, or cough. Pulmonary function parameters were measured by a Vitalograph spirometer (Vitalograph, Ltd., Buckingham, England). Measurements were made at the beginning of the test and 5 and 15 minutes after each test dose. Challenges were performed only if baseline FEV_1 was at least 80% of the predicted value. A decrease of 20% of baseline FEV_1 was scored as positive.
4. With GI complaints, the appearance of V or D was considered positive.

We considered a reaction appearing from a few minutes to 2 hours after ingestion of the last capsule as immediate, and reactions occurring after this period as late.

Treatment and follow-up

Patients with positive DBPCFCs started receiving diets that were absolutely free of the offending foods, taking care

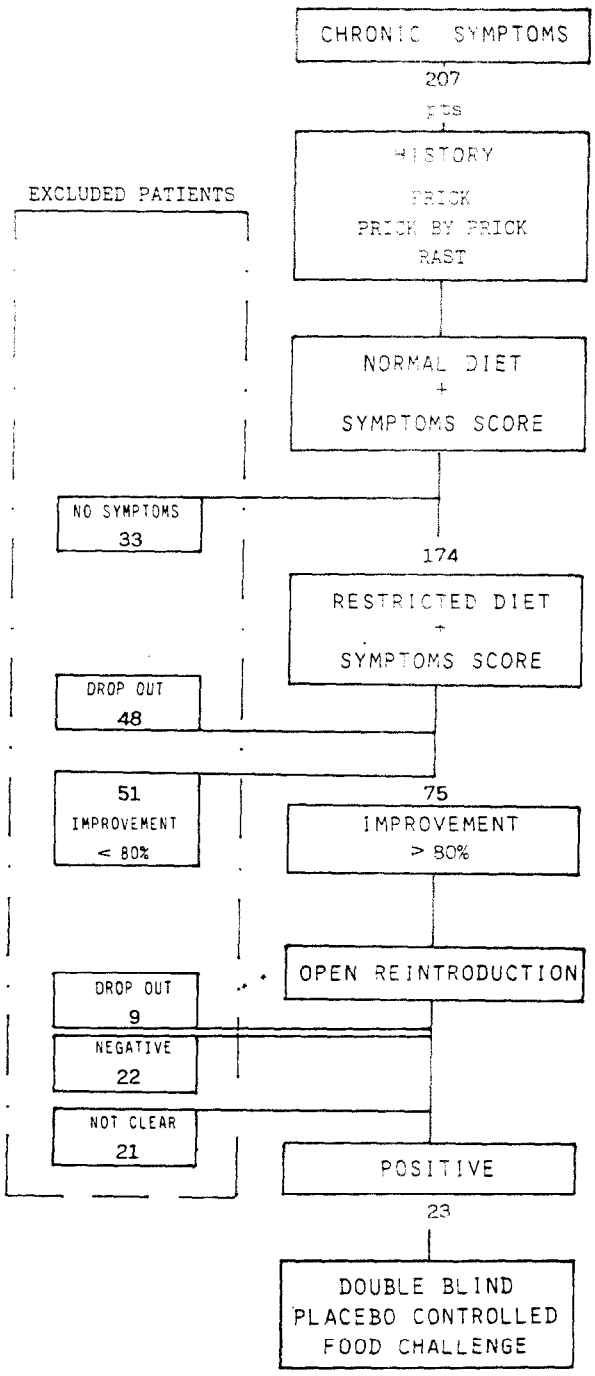

FIG. 1. Schedule of the diagnostic procedure and number of patients at each step.

to eliminate any small amounts masked in some food preparations. The patients were informed of the importance of strictly following the diet and the probability of being able to reintroduce the offending food into their diet without inducing any symptoms after an adequate period of avoidance. To prevent nutritional deficiencies, patients were provided with substitution tables of the main foods[2] (e.g., with allergy to milk or egg). Patients were observed periodically, at intervals of about 2 months, to check that they were

TABLE I. Patients with at least one initial positive food challenge

Patient	Age/sex (yr)	Age at onset (yr)	Food	SPT	RAST class	Symptoms in OFR	DBPCFC	Dose (gm)	Symptoms in DBFC	Time* Hr	Time* Min
1 A. R.	21 M	12	Hazelnut†	−	1	AS, R	+	7.5	AS, R	1	10
			Tomato†	+ + +	2	AS, R	+	3.5	AS, R		45
			Rice	+ + +	4	AS, R	−	15			
			Barley	+ + +	4	AS, R	−	15			
			Corn	+	3	AS, R	−	15			
			Wheat	+	2	AS, R	−	15			
			Oat	+ + +	3	AS, R	−	15			
			Potato	−	0	AS, R	−	15			
			Bean	+ +	2	AS, R	−	15			
2 B. N.	47 F	40	Milk	−	2	UR, AE	+	7.5	UR	1	5
			Potato	+ + +	2	UR, AE	+	15	UR, AE	1	25
3 M. L.	24 M	21	Wheat†	−	0	R	+	15	UR, R	10	
4 T. M.	22 F	17	Garlic†	+ + +	3	R, D	+	0.06	R, D		30
			Rice†	+ + + +	3	V	+	15	V	1	20
			Wheat	+ +	2	R	−	15			
			Corn	+ +	3	R	−	15			
5 B. M.	22 F	16	Milk	+ + +	3	R, AS	+	1.5	AS, R		25
6 A. P.	24 F	20	Milk	+ + +	2	UR, AS, R	+	0.5	UR, AS, R		15
7 M. L.	35 F	33	Milk	+ +	1	UR, AE, AS	+	15	UR, AS	1	30
8 B. A.	46 F	36	Egg white	+ + + +	0	R, AE	+	15	R, AE	1	40
			Egg yolk	+ +	0	R, AE	−	15			
			Milk	+ +	0	R, AE	−	15			
9 S. P.	21 M	5	Tomato	+ + + +	2	R	+	1.5	R, D		30
			Almond	+ + + +	NT	R	−	15			
10 F. G.	41 M	35	Hazelnut	NT	0	R	+	15	R	5	20
			Walnut	+ +	NT	R	−	15			
			Almond	NT	0	R	−	15			
			Peanut	−	0	R	−	15			

NT, Not tested.
*Time elapsed between food ingestion and onset of symptoms.
†These tests were made twice with the same result.

asymptomatic and were following the diet closely. If any symptoms occurred, patients were asked to record the food ingested in the previous 2 days. Unintentional intake of the forbidden food had to be recorded also.

After a period ranging from 1 to 2 years, depending on the kind of food and on the patient's request, DBPCFCs, SPTs, and RAST with the incriminated food were repeated. If the food challenge had become negative, the patient was allowed gradually to reintroduce the food into the diet. If the food challenge was still positive, the patient had to continue avoiding the food.

RESULTS

Results of DBPCFC

Twenty-three patients (10 patients were male; mean age, 33.4 ± 16.06 years; range, 17 to 57 years; 13 were female; mean age, 33.76 ± 15.37 years; range, 16 to 59 years) had symptoms when one or more foods were reintroduced into the diet. A total of 46 food challenges and 23 placebo challenges were made by a double-blind procedure (each patient was tested once with placebo).

Ten (mean age, 28.4 ± 13.15 years; range, 21 to 47 years) of the 23 subjects (44%) had at least one positive food challenge with negative placebo challenge (Table I). Six (mean age, 33 ± 15.75 years; range, 19 to 57 years) of the 23 subjects (26%) had negative food challenges and negative placebo challenge (Table II). Seven (mean age, 38.85 ± 18.18 years; range, 16 to 59 years) of the 23 subjects (30%) had positive placebo challenge (Table III). The 13 (seven and six, respectively) subjects with either a positive placebo or negative food challenge were not considered for further study.

The 10 patients with positive food challenge had a

TABLE II. Patients with negative food challenge

Patient	Age/sex (yr)	Age at onset (yr)	Food	SPT	RAST class	Symptoms in OFR	DBPCFC	Dose (gm)
1 C. S.	23 F	18	Milk	−	0	UR, AE	—	15
2 C. S.	20 M	8	Walnut	+ + +	NT	UR, AE	—	15
3 D. I.	57 F	47	Rice	+ + +	0	R	—	15
4 M. F.	26 M	25	Wheat	+	1	UR, V	—	15
5 M. E.	53 M	49	Milk	−	NT	UR	—	15
6 S. L.	19 F	17	Peanut	+ + + +	1	UR, AE	—	15

NT, Not tested.

TABLE III. Patients with positive placebo challenge

Patient	Age/sex (yr)	Age at onset (yr)	Food	SPT	RAST class	Symptoms in OFR	DBPCFC	Dose (gm)	Symptoms in DBFC	Time* Hr	Time* Min
1 A. P.	17 M	8	Tomato	−	NT	R	−	15			
			Placebo				+	15	R	1	25
2 F. G.	57 M	54	Potato	+ + +	0	UR, AE	+	15	UR	1	40
			Placebo				+	15	UR	2	
3 G. U.	54 M	47	Corn	+	1	UR, AE	+	15	AE	1	30
			Placebo				+	15	AE	1	30
4 R. G.	47 F	44	Wheat	−	0	UR	−	15			
			Egg white	−	2	UR	+	15	UR	1	30
			Garlic	+ +	NT	UR	−	7			
			Placebo				+	15	UR	1	40
5 S. A.	16 F	13	Rice	+ + +	3	UR	+	15	UR	1	45
			Corn	+	1	UR	+	15	UR	1	50
			Oat	+ +	NT	UR	−	15			
			Hazelnut	NT	2	UR	−	15			
			Placebo				+	15	UR	1	50
6 B. G.	59 F	56	Milk	−	0	UR, AS, R	+	7.5	AE	1	10
			Placebo				+	15	UR	1	50
7 D. C.	22 F	21	Wheat	−	0	R	+	15	R	2	
			Placebo				+	15	R	2	

NT, Not tested.
*Time elapsed between food ingestion and onset of symptoms.

total of 13 positive reactions; three subjects had positive reactions to two foods. Either SPTs or RASTs were positive in 11 of these subjects. Eight foods caused positive challenges: milk (four patients), tomato (two patients), hazelnut (two patients), wheat, rice, egg white, garlic, and potato (one patient each) (Table IV). The dose required to provoke symptoms ranged from 0.06 to 15 gm (Table I). Of the 13 positive reactions, 11 were immediate and two reactions were late. Analysis of food challenges and the symptoms provoked by OFR into the diet and DBPCFC demonstrated that dermatologic, respiratory, and GI symptoms frequently occurred together (Table I).

Four of the patients who subsequently gave positive reactions to placebo were first observed with complaints of UR, two with R, and one patient with complaints of UR, R, and AS. Reactions elicited by placebo in these patients were UR in three, R in two, UR and AE in two patients, one labial and the other periorbital. All reactions were immediate. The timing of symptoms is presented in Table III.

Results of follow-up

Patients were observed periodically while they were receiving the diet free of foods demonstrated to produce symptoms by DBPCFC. After 1 to 2 years, they

TABLE IV. Symptom-provoking foods at the time of the original food challenge and at follow-up

Food	No. of positive challenges at beginning of study	No. of positive challenges at follow-up
Milk	4	2
Hazelnut	2	2
Tomato	2	1
Egg white	1	1
Wheat	1	0
Potato	1	1
Garlic	1	1
Rice	1	1

again underwent DBPCFC, SPT, and RAST with the same foods (Table V). DBPCFC no longer induced any reaction in five of the 10 (50%) patients in which they were repeated, and five of the 13 (38%) originally positive challenges were negative at follow-up. In four patients, challenges were negative when they were repeated for the first time, after about a year of diet (from 12 to 14 months). In one patient (No. 6) the blind challenge with milk, still positive after 1 year, became negative after 2 years of milk-free diet. The other patients who were still positive at the first check refused to repeat the test and preferred to continue avoiding the incriminated food.

Foods no longer inducing reactions were milk (two patients), wheat, egg white, and tomato (one patient each) (Table IV). These foods were reintroduced gradually until the amount present in a regular diet was reached with no adverse effect. These foods are still perfectly tolerated 6 to 18 months after having been reintroduced on an unlimited basis. Only patient No. 6, after a symptom-free period of 4 months, during which time milk was gradually reintroduced, began to complain of occasional wheals and GI disorders; however, these symptoms were much milder than before the study. Results of SPTs and RAST demonstrated no clear-cut changes before and after dietary avoidance.

DISCUSSION

Our study provides good evidence that in adults, as already proved in children,[5, 6] the dietary avoidance of foods responsible for symptoms may be an effective measure in food allergy.

In subjects with a mean age of 30.3 years, 38% of the foods originally producing a positive challenge were well tolerated in the diet after 1 to 2 years of avoidance. This result appears reliable, since it was obtained in patients who were rigorously diagnosed and checked by DBPCFC. This procedure enabled us to confirm the presence of allergic food reactions only in 10 of 23 patients with suspected food allergy. The remaining 13 patients were excluded from the study because their reactions to foods were not confirmed by the double-blind technique. In fact, in seven of 13 subjects, the blind challenge with placebo was positive (and thus the patients were considered unreliable), and in six subjects, the open positive reactions were not confirmed in blind conditions.

The discrepancy between open and blind challenges may be explained by the psychologic interferences and the frequent erroneous associations of complaints with some foods that can arise in the absence of objective evaluation. Our results agree with other studies in adults[8-11] and children[12-16] that indicate that only about half the patients believed to be allergic to a food react to the food when they are challenged in controlled conditions. Bernstein et al.[8] found that only nine of 22 adult patients (41%) tested by DBFC reacted to the suspected foods. A similar percentage of positive reactions was found by Atkins et al.[9, 10] in a recent study on adults, carried out in strictly controlled conditions. In studies on children by May,[14] Bock et al.,[15] and Bock and May,[16] only about 40% of patients tested in blind had positive food challenges.

An intriguing aspect of our results is the large number of positive reactions to placebo, observed in 30% of patients (7/23). Although the finding is difficult to interpret, it is well-known that psychologic influences play a very important role in conditioning the appearance of reactions to foods, especially in adults, whereas in DBFC studies on children, no reactions to placebo are described. In the study on adults by Bernstein et al.,[8] two of 10 (20%) patients tested with placebo gave positive reactions. In a study by Pearson et al.,[17] of eight patients tested in blind with placebo, six patients (75%) were positive. The peculiarity of our study is that in our patients all the reactions to placebo were objective (wheals and R) and undistinguishable from those elicited by foods in DBFC-positive patients. In the studies cited above, reactions to placebo were subjective, and only in one of two of the patients in Bernstein et al.[8] did an objective reaction occur.

The high incidence and the objective nature of reactions to placebo observed in our study may be explained by the fact that our patients who submitted to DBPCFC were selected from a starting group of 207 patients who were subjected to a strict diagnostic protocol that included the preliminary exclusion of all other allergic causes or other pathologies. In our pa-

TABLE V. Results of DBPCFC, SPT, and RAST at the time of the original food challenge and at follow-up

Patient	Food	Symptoms	Date*	SPT	RAST class	DBPCFC	Dose (gm)
1 A. R.	Hazelnut	AS, R	9/85	–	1	+	7.5
			9/86	–	1	+	3.5
	Tomato	AS, R	10/85	+ + +	2	+	3.5
			9/86	+	1	+	3.5
2 B. L.	Milk	UR	7/85	–	2	+	7.5
			7/86	–	1	–	15
	Potato	UR, AE	7/85	+ + +	2	+	15
			7/86	+ + +	2	+	15
3 M. L.	Wheat	UR, R	6/86	–	0	+	15
			6/87	–	0	–	15
4 T. M.	Garlic	R, D	7/85	+ + +	3	+	0.06
			7/86	NT	3	+	0.3
	Rice	V	9/85	+ + +	3	+	15
			7/86	+ + +	2	+	15
5 B. M.	Milk	R, AS	11/86	+ + +	3	+	1.5
			5/87	+ + +	3	+	15
6 A. P.	Milk	UR, AS, R	7/85	+ + +	2	+	0.5
			7/86	+ + +	2	+	0.5
			6/87	–	1	–	15
7 M. L.	Milk	UR, AS	4/86	+ +	1	+	15
			7/87	+ +	2	+	15
8 B. A.	Egg white	R, AE	2/86	+ + + +	0	+	15
			4/87	+ + +	0	–	15
9 S. P.	Tomato	R, D	5/86	+ + + +	2	+	1.5
			7/87	+ + + +	1	–	15
10 F. G.	Hazelnut	R	5/86	NT	0	+	15
			7/87	–	0	+	15

*Months/year.

tients, the correlation of symptoms with a food had been demonstrated on OFR on several occasions and could be regarded as clearly related, and all other pathologies had been excluded.

Reactions to placebo, as well as to foods, appear therefore to occur in patients really convinced that they are intolerant to foods. Thus, on the basis of our results and the importance of psychologic influences, DBPCFC is the only reliable diagnostic procedure for food allergy, as previously suggested by many authors.[5, 18-21] In addition, a double-blind procedure is the only correct way to assess the efficacy of any treatment of food-allergy diseases. In adults we found negative reactions after diet to originally positive food challenges in a proportion (38%) similar to the finding by Sampson[5] (42%) in children suffering from atopic eczema after the same period of diet. Although our patients had UR and R and not an atopic eczema, these two studies are comparable, since they both deal with subjects with chronic symptoms and no severe reactions. Thus, the diet appears to be equally effective in patients with food reactions of similar severity despite the different ages. Bock,[22] considering severe symptoms also, found from 19% to 44% resolution, depending on the age at onset of symptoms, in a study of children.

The improvement that we obtained with the diet in our subjects appears very important, although obviously our results would have been still more notable if we had had a control group of subjects not following the diet. However, one indirect confirmation of our result is based on the fact that our patients had been suffering from UR and/or R for a mean of 8 years, much longer than our 1 to 2 years of follow-up. During these years, patients had continued to eat the offending foods, since they had not yet identified them. Thus, their improvement after the diet appears to be really correlated with the avoidance of the responsible foods. In this study, we could not arrange a control group because there were too few patients with proved

reactions to foods. In other studies on this topic, patients with reactions to foods but who did not follow a diet and hence were used as control subjects were very few (e.g., five in Sampson's study[23]); in fact, for ethical reasons, the ingestion of a surely noxious food to a patient who agrees to avoid it cannot be allowed.

It is difficult to explain why the avoidance of the offending food can reestablish tolerance to the food itself, particularly since we could not find any laboratory parameter or detail from the patient's history that enabled us to predict the clinical course. When the patients whose food allergy persisted were compared with the patients who had recovered from the food allergy, there was no significant difference in serum food-specific IgE levels, positive prick tests, age, sex, or the age at onset of symptoms.

A key factor conditioning the disppearance of symptoms appears to be the kinds of food involved. In our study on adults, as in Bock's study[22] on children, reactions produced by milk and egg appeared to be more likely to stop than reactions produced by foods of the nuts and seeds group. In Bock's[24] study, children allergic to peanuts or orange maintained this sensitivity for years.

However, in our study, the most important factor influencing the disappearance of symptoms appeared to be complete avoidance of the offending food(s). Contact with the incriminated food, however it was maintained, caused symptoms to persist. This was the case of patient No. 4, a young woman working in a factory producing spices, and therefore exposed to inhalation of garlic. After the DBPCFC, she avoided eating garlic but could not help inhaling it, and she was still positive at follow-up. In patient No. 5, a detailed history collected after the second, still positive, food challenge revealed that she had continued to drink small amounts of milk, despite her dietary restrictions.

This case occurred among our patients whose compliance appeared to be excellent because they had scrupulously followed a rigid diagnostic protocol and appeared seriously determined to identify and then to avoid the offending food(s). It underlines the importance of having objective means to evaluate a patient's compliance. Some studies have demonstrated monitoring food-specific IgG antibodies to be a good indicator of dietary compliance.[25] However, no commercial kits are yet available to quantify these antibodies.

In conclusion, in adults with proved food allergy, the elimination of the offending food(s) can often be followed by their eventual reintroduction, and this should surely motivate patients to comply with dietary restrictions. To improve the chances of success, really complete avoidance of the offending food(s) is important. However, it appears difficult, if it is not impossible, for patients to eliminate hypersensitivity to foods like peanuts and nuts.

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