

IS SKIN TESTING IN ALLERGIC PATIENTS WORTH THE EFFORT?

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TO DETERMINE the value of skin testing to foods and inhalants 1,900 allergic private patients were studied. Tables I and II represent a breakdown of the 1,900 patients. There were 1,104 females and 796 males. A total of 131,865 skin tests were carried out on this group with no deaths. This was an average of 70 tests per patient. The infants received relatively fewer tests in comparison with the older age groups because of the limited variety of foods eaten at this age. Tables III and IV show the reactions to the various allergens. In this series, a negative reaction meant that no difference was noted from the general average of clearly nonreactive tests. A local reaction with edema covering approximately twice the area as the negative was a 2 plus. Local edema (not enough to cover twice the area but more than the negative) was a 1 plus. A reaction larger than 2 plus but without pseudopods was a 3 plus. When pseudopods are present the reaction is designated as a 4 plus. One plus or doubtful reactions may represent a clinical offender at times and yet the large number of doubtful reactions obtained make it impractical to attach too much significance to them. Chocolate, cow's milk, wheat, tomato, malt, corn, orange, black pepper, and coffee, in that order of frequency, were found to lead the list of food reactions. Inhalant reactions in West Texas are led by Russian thistle and followed in order by Bermuda grass, house dust, tobacco, chicken feathers, ragweed, and cow hair. All of the extracts used for testing in this study were purchased from approved laboratories.* Some of the extracts had to be diluted because reactions were consistently obtained on normal individuals.

SAFETY

Probably the most important factor in evaluating any procedure in medicine is whether or not it is dangerous. The old saying, "If no good can be done, at least do no harm," is applicable to any test. In this fairly large number of skin tests, there were no deaths and no serious reactions. An aggravation of the symptoms of the allergic state for which the patient was being tested was the only untoward reaction encountered. Deaths have been known to occur from skin tests, but from this series it would seem that the procedure is safe if a few precautions are observed. First of all, it should be kept in mind that little is to be gained by testing a patient to a food or inhalant that is known to give clinical symptoms. Since the known offending agent should be eliminated regardless of the result of the skin test, the possibility of a severe reaction or even death must not be forgotten. In this series, many of the patients were not tested to agents that were known to give severe reactions in daily life. The questionable agents were first tested by the scratch method and if the

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*Abbott Laboratories, Lederle Laboratories, and Arlington Chemical Co.

TABLE I. TYPES OF ALLERGIC DISEASE IN 1900 PATIENTS

TYPES	NO.
Hay Fever	875
Atopic Eczema	418
Asthma	279
Urticaria	147
Other Allergies (Gastrointestinal allergy, migraine, etc.)	181
Total	1900

results were negative, were followed by intradermal testing. Routinely, all patients below the age of 12 and over 60 years were tested by the scratch method first. Reactions occurring from scratch tests, of course, are more easily controlled than those resulting from intradermal injection since wiping off of the allergen will usually control the reaction.

POSITIVE REACTIONS

Numerous writers¹ over the past twenty years have stressed the fact that a positive skin reaction does not invariably mean clinical sensitivity to that allergen. Sixteen per cent of the skin tests performed in this series gave 2 plus or stronger skin reactions. Of these positive tests, it is difficult to give an accurate estimate of the actual clinical sensitivity that this group embraces. The patient's observations may be very misleading in some instances, while in others their underenthusiasm for following allergic instructions make the clinical evaluation of skin tests impossible. These facts are of major importance when skin tests are being evaluated. Most allergists agree that skin testing to inhalants and pollens is a valuable procedure. However, when the subject of testing to foods is brought up there is considerable controversy over how many foods should be included routinely and just how much significance can be placed on any positive food test. Of the 1,900 patients in this series, 632 were followed for a sufficient period of time and cooperated enough to enable us to evaluate the positive food tests that were obtained. The twenty foods that reacted most often by skin test are listed in Table V. The other positive food tests were so rarely correlated with clinical sensitivity that they can be ignored. From Table V it will be noted that 38 per cent of the positive chocolate skin tests were correlated clinically as causing the hives. Therefore 62 per cent of the positive chocolate skin tests in case of hives may be considered false positives. Also, it will be noted from the table that while coffee, spinach, pear, cantaloupe, cinnamon, beans, and grapes gave a high incidence of positive tests, there was no actual clinical importance of these foods. Egg white ranked six-

TABLE II. AGES OF ALLERGIC PATIENTS

AGE GROUPS	NO.
Infants	211
2-12 yrs.	398
12-60 yrs.	1256
Over 60 yrs.	35
Total	1900

TABLE III. POSITIVE INHALANT REACTIONS

	2 PLUS	3 PLUS	4 PLUS	TOTAL NO.
Russian thistle	239	86	45	370
Bermuda grass	268	55	28	351
House dust	225	53	11	289
Tobacco	203	67	14	284
Feathers (chicken)	240	37	5	282
Ragweed	189	52	17	258
Cow hair	211	39	1	251
Wool	203	35	2	240
Johnson grass	173	38	21	232
Pyrethrum	193	25	0	218
Kapok	193	23	0	216
Cat hair	165	9	2	176
Dog hair	157	8	0	165
Mountain cedar	126	27	6	159
Rayon	144	12	1	157
Tragacanth	132	0	6	138
Horse hair	109	10	3	122
Careless weed	102	16	4	122
Silk	94	12	0	106
Orchard grass	81	15	2	98

Less Frequent Positive Inhalant Reactions (Total No.).—Goat hair 97, rabbit hair 89, cocklebur 78, pigweed 67, guinea pig hair 63, elm 57, sagebrush 49, horse dander 48, sycamore 47, camel hair 38, flaxseed 27, alternaria 21, hormodendrum 20, jute 20, sweet vernal grass 17, June grass 17, karaya 9, timothy 9, hickory 8, marsh elder 8, burning bush 6, walnut 5, pine 5, and maple 3.

TABLE IV. POSITIVE FOOD REACTIONS

	2 PLUS	3 PLUS	4 PLUS	TOTAL NO.
Chocolate	381	77	9	467
Cow's milk	380	52	4	436
Wheat	324	75	14	413
Tomato	261	67	9	337
Malt	272	35	6	313
Corn	263	29	8	300
Orange	247	35	3	285
Black pepper	213	38	5	256
Coffee	218	29	3	250
Cottonseed	199	39	5	243
Oats	208	17	4	229
Spinach	204	20	1	225
Pear	156	55	4	215
Cantalope	170	41	4	215
Banana	188	22	1	211
Egg white	187	18	4	209
Cinnamon	179	30	0	209
Navy bean	191	13	4	208
Grape	175	30	3	208
Halibut	186	16	3	205

Less Frequent Positive Food Reactions (Total No.).—Lemon 202, mustard 202, apple 193, nuts 187, carrot 186, hops 186, grapefruit 181, soybean 177, dates 176, peas 172, pork 170, white potato 170, apricot 163, asparagus 163, rye 161, strawberry 160, peach 160, raisin 155, rice 155, pumpkin 154, whole wheat 154, parsley 151, cauliflower 151, nutmeg 149, pineapple 145, cherry 145, string bean 141, lettuce 141, tea 140, mushroom 138, beef 135, clove 134, raspberry 133, squash 131, blackberry 131, peanut 131, cabbage 131, green pepper 130, blackeye pea 128, chicken 127, fish 124, sweet potato 122, plum 121, lamb 118, broccoli 116, watermelon 116, cranberry 115, prune 115, beet 115, celery 114, cucumber 110, turnip 106, onion 103, watercress 102, barley 101, radish 99, buckwheat 96, coconut 94, vanilla 92, pecan 90, almond 89, rhubarb 87, veal 85, turkey 84, bass 83, shrimp 82, liver 73, olive 73, goat milk 67, salmon 63, sardine 63, allspice 60, eggplant 57, oyster 54, sage 50, black walnut 50, fig 50, tangerine 49, English walnut 36, bay leaves 29, ginger 28, caraway seed 27, egg yolk 25, anise 25, tuna fish 18, currant 18, lime 16, parsnip 8, and haddock 3.

teenth in the list of positive skin reactions but was one of the most important in the clinical evaluation. From this study, it is questionable whether one is justified in routinely testing patients to many foods. A positive food test that has less than 25 per cent chance of being important clinically would seem to be wasted effort. Therefore, on the basis of Table V, patients with urticaria should be tested routinely to only six foods—chocolate, milk, wheat, orange, cottonseed, and egg white. Hay fever and asthma patients should be routinely tested to chocolate, milk, corn, wheat, a spice (black pepper), egg white, and fish (halibut). Atopic eczema in children would seem to require routine testing to milk, wheat, egg white, tomato, malt, corn, orange, banana, and fish (halibut). Adult atopic eczema should require very little food testing routinely—to egg white only. Any food that a patient suspects should also be added to the routine group of tests.

TABLE V. PER CENT OF POSITIVE SKIN TESTS OF CLINICAL IMPORTANCE
(BASED ON 632 PATIENTS ACCEPTABLE FOR REVIEW)

	HIVES	HAY FEVER	ASTHMA*	ECZEMA (CHILD)	ECZEMA (ADULT)	MISCEL- LANEOUS
Chocolate	38	47	29	16	5	0
Cow's milk	25	31	58	92	22	25
Wheat	66	35	33	61	9	33
Tomato	6	5	16	50	7	25
Malt	0	6	4	33	16	0
Corn	12	16	29	33	0	33
Orange	40	18	10	44	0	0
Black pepper	0	33	33	0	0	0
Coffee	0	0	0	0	1	0
Cottonseed	25	18	19	0	0	0
Oats	0	18	8	0	0	0
Spinach	0	0	0	0	0	0
Pear	0	0	0	0	0	0
Cantalope	0	0	0	0	0	0
Banana	0	15	10	50	0	0
Egg white	74	36	73	62	66	0
Cinnamon	0	11	8	0	0	0
Navy bean	0	0	0	0	0	0
Grape	0	0	7	0	0	0
Halibut	14	25	25	50	0	0

*Many of the asthmatic patients also had hay fever but are included only under the chief complaint.

NEGATIVE REACTIONS

It is also accepted that individuals known to be clinically sensitive to foods and inhalants may show negative skin reactions to these allergens.² It cannot be accurately estimated how many of the negative tests in this series were clinically false negative tests. Many of the patients proved to be unable to eat foods or tolerate inhalants that gave negative reactions. Many others due to poor cooperation, could not be followed closely enough, to determine the presence of false negative tests. Since no difference was noted in the various commercial extracts used, it is believed that false positive and negative tests in known sensitive patients will occur regardless of which presently available commercial extracts are used or how much care is exercised in testing. It is possible that different types of skin testing material, such as raw foods³ and other methods of

testing, such as the iontophoretic method⁴ will, in the future, reduce the number of false negative and positive reactions. Although these facts will detract from the value of testing, they should not cause the procedure to be ridiculed or eliminated from the allergy study of a patient. Many helpful clues may be discovered by routine skin testing and the mystery of the cause of the allergic state may be cleared up very easily.

VALUE OF SKIN TESTING

From these confusing facts, one can justly question the value of skin testing. However, the interpretation of the tests, as in most other tests in medicine, will determine their value when applied to the clinical handling of the particular case. To discover the cause or causes of a patient's allergy will often require the physician to use every diagnostic tool at his command. The best diagnostic tool in allergy is a careful history of events, conditions, and other factors relating to the present illness. It is certainly the fastest and least expensive of the methods available to find the clues that will lead to the cure of an allergy. Not infrequently, this is all that is needed for the successful handling of the case. For example, if the patient states that his asthma occurs only after he sprays disinfectant about the room, nothing further need be done in order to advise the patient intelligently. If the history reveals milk as an offender and yet the patient is eating milk products, a trial period without milk and milk products for one week may be all that is necessary to bring about a cure. Any suspicious food brought out by the history should be eliminated for one week to see the effect. Any suspicious inhalant (perfumes, disinfectants, etc.) should be eliminated in the same way. If careful history taking reveals few or no clues of importance, then skin testing will probably serve as a short cut to the finding of the offending agent. Patients must be impressed with the fact that positive tests are only clues and that the corresponding allergens must be eliminated to determine their importance in the particular illness at hand. To skin test a patient and give him a long list of positive offenders and not instruct him as to their significance is poor practice of medicine. Patients must also be told the foods that contain the offender to be eliminated. For example, to tell the patient to eliminate milk and not remind him that butter is a milk product may make the difference between success and failure in relieving his allergy.

EMPIRICAL PROCEDURES

Too often, careful history and elimination of suspects brought out by skin testing fails to reveal the allergy secret. The next step must be empirical elimination of foods and inhalants. Various trial diets may be used, such as those advocated by Rowe.⁵ The elimination of most of the inhalants can also be tried on an empirical basis. This is best accomplished during months of the year when wind-borne pollen and molds are at a minimum. To isolate a patient in a clean room stripped of everything except a canvas cot for several days will bring out the importance of such common offenders as wool, feathers, orris root products (perfumes, powders, etc.), dog hair, and others. If several days of such isolation causes marked improvement, as is the case occasionally,

the various materials can be introduced into the room one by one to notice the clinical effect. These empirical methods of food and inhalant elimination are practical commonsense allergy tests.

PSYCHOGENIC FACTORS

In studying a series of allergy patients, one is impressed by the psychogenic factors that not only influence the course of the disease but very often cause the allergic flare-up. Sir William Osler as far back as 1912 noted the neurotic elements in asthma.⁶ These factors are particularly evident in such allergies as hives, atopic eczema, gastrointestinal allergy, allergic migraine, and occasionally in asthma. Too often, for example, patients gave strong positive reactions to such foods as chocolate and on study it seemed that chocolate was the cause of asthma. However, after a marital disagreement had subsided, chocolate could be eaten with no further difficulty. This naturally cast considerable doubt upon the value of that positive chocolate reaction. It is possible, however, that the psychogenic factor acts as the trigger mechanism enabling the chocolate to cause the asthma. When the psychogenic factors are removed, chocolate can again be eaten without symptoms until another factor sets off the trigger mechanism.

SUMMARY

1. The results of 131,865 skin tests, performed on 1,900 allergic patients, are studied.
2. Chocolate, cow's milk, wheat, tomato, malt, corn, orange, black pepper, and coffee, in that order of frequency, led the list of food reactions.
3. Russian thistle, Bermuda grass, house dust, tobacco, chicken feathers, ragweed and cow hair led the inhalant reactions in West Texas.
4. Food testing is time consuming, expensive, and unimportant in most instances. The foods that should be tested in hives, hay fever, asthma, childhood, and adult eczema are indicated.
5. Skin testing is a safe procedure if proper precautions are observed.
6. Skin testing is worth the effort since it very often serves as a short cut to the finding of the offending agent.

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