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The long-term effect of moving on patients with asthma and hay fever

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This is a "follow-up" study of allergic alumni seen in the University of Iowa Clinics from 15 to 25 years ago. Correspondence with them served to gather information on the long-term effect of a change in locale. The patients were from the Midwest where Alternaria mold and ragweed are the major allergens to which exposure is very heavy. Sixty-two per cent of the patients remaining in the Midwest considered themselves much better than they were years ago. Eighty-three per cent of those who had moved west regarded themselves as all or much better, and in 71 per cent this change had occurred promptly after moving. Improvement experienced in the first year usually was maintained, the development of clinically significant new allergies being uncommon. Fourteen of the 29 patients who had not done well over the years described themselves as having nasal polyps.

Patients ask, "Should I move to get rid of my asthma?" Since we view the tendency to become allergic as a constitutional problem, these patients often are told that moving will probably give only temporary relief until other allergies develop. Actually the literature contains very little information on the frequency of clinically significant new allergy. Immigrant studies¹⁻² and the study of a new town formed around an industry³ suggest that between 70 to 80 per cent of new cases in these situations occur in people without previous allergic symptoms. Since the expected rate of previous allergic symptoms in an adult population is somewhere between 10 and 20 per cent,⁴⁻⁵ previously allergic people are not very much overrepresented among the subjects with new allergies in these studies. We need to have some prospective information about people who move to other climates before concluding that new allergies are very likely to develop. Until prospective studies can be made, allergic populations who

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CHART I

Symptoms of asthma _____, hay fever _____.

Began at age _____ in 19____ when living in _____.

While living there were you:

1. Gradually all better _____; no recurrence _____; worse again at age _____.
2. Gradually much better _____; no recurrence _____; worse again at age _____.
3. Little change for _____ years; worse later at age _____.
4. Gradually worse _____.

If you have moved either in or out of the state, please answer below.

Moved to _____ state, on a farm _____, town _____, at age _____.

1. Promptly all better _____; no recurrence _____; worse again at age _____.
2. Promptly much better _____; no recurrence _____; worse again at age _____.
3. Gradually all better _____; no recurrence _____; worse again at age _____.
4. Gradually much better _____; no recurrence _____; worse again at age _____.
5. Little change for _____ years; worse later at age _____.
6. Promptly worse _____; gradually better at age _____; worse again at age _____.
7. Gradually worse _____.
8. If worse, do you attribute this to associated respiratory infection? _____ or to other specific event or exposure?
9. Did you have any desensitization shots in this period? _____. If so, age _____ to age _____.

can be followed up are a better source of information about moving than are our colleagues in other areas who see only the patients who continue to have problems. The present report is the result of corresponding with 245 alumni who were patients for asthma or hay fever in the University of Iowa Clinics from 15 to 25 years ago to find out how they have fared after settling in various parts of the country.

METHODS

The records of the University of Iowa Student Health Service for the period from 15 to 25 years ago were searched for all clearly documented cases of asthma and hay fever. Current addresses were obtained from the Alumni Office for 278 of these patients. In this way we were able to correspond with all but 33 (12 per cent) who did not answer even certified mail.

The questionnaire was divided into two sections, a letter asking specific questions about their present state (and encouraging a further descriptive note on its reverse side), and a McBee marginal punch card on which moves and their apparent effect could be recorded.

The front side of the McBee punch card used for this purpose is shown below (Chart I). The other side was printed in the same way allowing for four changes of location, and the patients were encouraged to make further comments on the back of the letter accompanying the card. The letter also asked specifically about the development of nasal polyps. Many patients wrote long descriptions of their experiences with allergy over the years since their student days. Aqueous extracts are used for intracutaneous tests and the reactions are recorded as slight, moderate, or marked: Slight is a wheal less than 0.5 cm. in diameter but distinctly greater than negative or control tests; moderate is a wheal greater than 0.5 cm. but without pseudopods; marked is a larger wheal with pseudopods.

RESULTS

Of the 245 respondents included in study, old skin test records were available for 188. Another 57 patients not skin tested in our clinic had recurrent seasonal hay fever or asthma when they were seen in Student Health. Twenty-one of these 57 were treated in the Student Health Clinic with extracts obtained from other allergy clinics. Except for a few asthmatic patients, all the patients had

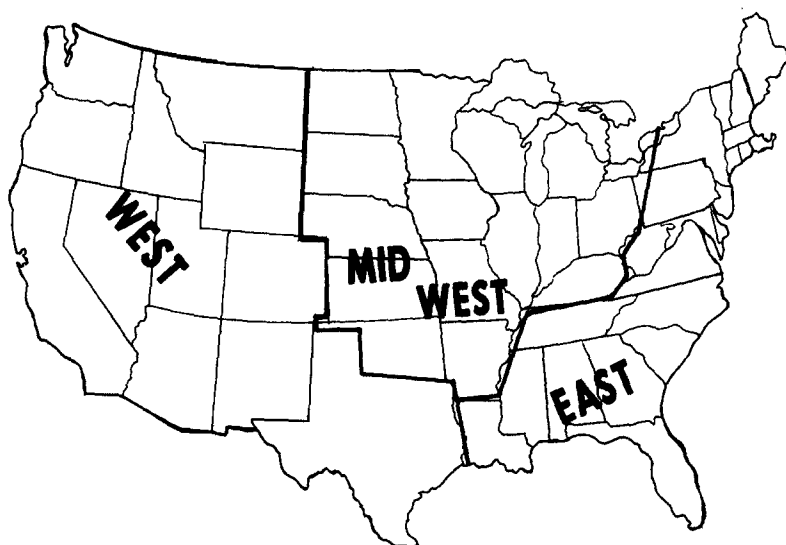


FIG. 1. Geographical division of the United States used in this study.

TABLE I. Per cent distribution of hay fever and asthma patients

	East	Midwest	West
Hay fever	43	43	40
Asthma	57	57	60

summer symptoms in Iowa. One hundred and forty-three patients had asthma or asthma and hay fever, and 102 had only seasonal hay fever. There were 198 men and 47 women reporting. This distribution reflects the predominantly male university population in which men outnumber women about 3 to 1. About 25 per cent were medical students.

The areas designated as West, Midwest, and East are shown in Fig. 1 and follow roughly a division of the United States into regions with different exposure to *Alternaria* and ragweed, the most important seasonal allergens of the Midwest. Although it might be expected that people with asthma might be more likely to move in hope of relief, the distribution of hay fever and asthma among our patients was about the same for those settling in each area (Table I).

The experience of those who moved to the West

Table II shows the experiences of the 88 people who settled in the West. This is the area in which the allergens are most different from our own, and this was the area from which the largest number of people reported dramatic improvement. Of the 88 patients settling in the West, 66 or 75 per cent regarded themselves as either promptly all better or much better and remained so at the time of writing.

The skin test data included in the tables are incomplete in that during the years before 1950 molds were not regularly used in skin testing. The skin tests

TABLE II. Experience of patients who moved West

Condition	%	Total No.	No skin test reco
Promptly all better	47	41 (1 polyps)	10
Promptly much better	28	25	6
Gradually all better	0	0	0
Gradually much better	8	7	3
Same	4	4	1
Worse	6	5 (3 polyps)	1
New allergy	7	6 (?)	0
Total	100	88	21

*Molds were not regularly employed in the 78 students tested before 1950.

†Oak, now eucalyptus.

‡Now grass.

of the 110 more recently tested students showed the following distribution of positive reactions to the main allergens: ragweed, 28; ragweed and mold, 34; mold, 34; and other allergens, 14. The symptomatic grass pollen season lasts only 2 weeks in our area, so that people primarily allergic to grass may not seek attention as frequently as those who are ragweed or mold sensitive.

A few patients not included in the "all better" category checked the "all better" answer but wrote, as an afterthought, that they did have a few mild symptoms. This appraisal may well have been true of others who considered themselves all better, since allergic patients sometimes disregard mild nasal symptoms if their asthma is relieved. Three of the 5 patients who considered themselves worse had been told that they had nasal polyps, and the fourth believed that he was worse because of intercurrent respiratory infection. Of the 6 patients who believed that they had new allergies in the West, four complained of Bermuda grass, one complained of orange blossoms, and one complained of Eucalyptus trees. The patient complaining of Eucalyptus trees was treated with oak pollen desensitization in Iowa years ago, and the one who complained of orange blossoms had a positive skin test to "mixed tree" extract while in Iowa. Thus there is some question as to whether these new complaints represent truly new allergy. Of the 4 patients with symptoms from grass pollen, 2 had positive skin tests for grasses years ago when they were tested in Iowa, one had a negative test for timothy at that time, and one was not tested in our clinic.

In summary, the great majority of the people who moved from Iowa, where they had developed their allergies, to the West and Southwest seem to have fared well with lasting improvement in their allergic symptoms.

The patients who moved to the East

Many patients had spent a year or two in the East or abroad, often with some improvement of their symptoms. However, only 49 had settled in the East for at least 5 years at the time of writing. This experience is shown in Table III. Five of the 7 who thought they were worse stated that nasal polyps had

Positive skin test reactions								
Dust or dander only	Mold*	Ragweed	Ragweed, grass	Ragweed, trees	Ragweed, mold	Ragweed, trees, grass	Ragweed, grass, mold	Trees, grass
2	7	12	3	3	4	0	0	0
3	4	6	2	1	3	0	0	0
0	0	0	0	0	0	0	0	0
1	1	0	1	0	0	1	0	0
2	0	0	1	0	0	0	0	0
1	0	0	2 (Texas)	0	1	0	0	0
2	0	0	2	1†	1‡	0	0	0
11	12	18	11	5	9	1	0	0

been found. In comparison, only 2 of the remaining 40 who were the same or better had been told they had nasal polyps. One patient with fall hay fever described himself as having a new allergy in the springtime. No skin test record is available for this patient who was being treated with ragweed.

Experiences of people who remained in the Midwest

The symptoms of most of the people who had remained in the Midwest had also improved with the passage of time. Table IV shows their experiences. Three of the patients who continued the same symptoms and 6 of the patients who described themselves as worse had been told that nasal polyps had developed. One asthmatic patient stated that he had been better; then 21 years later, after "a respiratory virus," he became worse. Another described herself as better but then worse 15 years later when polyps developed after a respiratory infection. Two of the patients who originally had mainly fall symptoms now have increased springtime symptoms as well. One of these previously had a reaction to timothy and to "mixed trees."

Comparison of those moving to different areas

Table V compares the percentages of patients who feel that they are better or worse in each area of settlement.

Well over half of the patients considered themselves much better than they were years ago, including even those remaining in the Midwest where persistent symptoms were most common.

Seventy-five per cent of those who moved to the West considered themselves either *promptly* all better or much better. The difference between staying in the Midwest as compared with going to the East is less clear, since fewer people moved east and fewer described dramatic change. Of the 49 patients who moved east, 29 per cent described prompt improvement with the change of environment. The differences in improvement experienced in various areas are statistically significant at the $p < 0.01$ level using the chi square test. Statistical comparison

TABLE III. Experience of patients who moved East

Condition	%	Total No.	No skin test recor
Promptly all better	2	1	1
Promptly much better	27	13	1
Gradually all better	4	2	1
Gradually much better	37	18 (1 polyps)	3
Same	14	6 (1 polyps)	1
Worse	12	7 (5 polyps)	1
New allergy	4	2 (?)	2
Total	100	49	10

*Molds were not regularly employed in the 78 students tested before 1950.

TABLE IV. Experience of patients remaining in Midwest

Condition	%	Total No.	No skin test recor
Promptly all better	0	0	0
Promptly much better	0	0	0
Gradually all better	10	11	3
Gradually much better	52	56	17
Same	20	22	3
Worse	16	17 (6 polyps)	2
New allergy	2	2 (?)	1
Total	100	108	26

*Molds were not regularly employed in the 78 students tested before 1950.

TABLE V. Results of moving away from Iowa in patients with asthma and hay fever

Condition	East (%)	Midwest (%)	West (%)
Promptly all better	2	0	47
Promptly much better	27 } 29	0 } 0	28 } 75
Gradually all better	4	10	0
Gradually much better	37 } 41	52 } 62	8 } 8
Same	14	20	4
Worse	12 } 26	16 } 36	6 } 10
New allergy	4?	2?	7?
Total	100	100	100

of the relatively small number of patients who were worse or no better is not included, because such unknown factors as the possible motivation for those who have severe chronic respiratory disease to stay near relatives or to choose mild climates makes it unwise to draw conclusions on the basis of the information we have.

Positive skin test reactions								
Dust or dander only	Mold*	Ragweed	Ragweed, grass	Ragweed, trees	Ragweed, mold	Trees, ragweed, grass	Mold, trees, grass, dander	Grass
0	0	0	0	0	0	0	0	0
0	0	4	3	1	2	1	1	0
0	0	1	0	0	0	0	0	0
2	0	4	4	2	2	0	0	1
1	1	3	0	0	0	0	0	0
3	0	1	0	0	2	0	0	0
0	0	0	0	0	0	0	0	0
6	1	13	7	3	6	1	1	1

Positive skin test reactions							
Dust or dander only	Mold*	Ragweed	Ragweed, grass	Ragweed, trees, grass	Ragweed, mold	Mold, trees	Grass
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	3	3	2	0	0	0	0
4	6	10	5	3	9	1	1
2	6	3	6	0	2	0	0
3	4	4	3	0	0	1	0
0	0	0	0	1	0	0	0
9	19	20	16	4	11	2	1

One thing that can be said about all areas is that, if there was improvement after moving, the improvement was usually maintained over the years. Only a few people reported symptoms in new seasons or attributed difficulties to the development of new allergies. Although we did not specifically ask, quite a few people volunteered that their children had developed allergies typical of the new place.

Of the 157 people who remained in the Midwest or went to the East where the allergens are not very different, 89 had desensitization injections for a year or more. Of these treated patients, 17 per cent took them for only one year, 25 per cent for 2 or 3 years, 29 per cent for 4 or 5 years, and 29 per cent for more than 5 years. Usually we did not fully control the treatment or follow these patients ourselves so that details of treatment and environmental precautions are not available. Treatment had usually been begun in childhood or during their student days and in only a few instances coincided with the time of settling in other parts of the country. On a long-term basis there were as many people who did well without treatment as with treatment, but since patients taking treatment were self-selected for a variety of reasons, including more severe or persistent difficulty, the comparison is not likely to be valid.

Among the small number of patients who did badly, there were a few more who were untreated than treated, but no valid conclusion can be drawn because negative skin tests and therefore lack of specific treatment was more frequent in patients with chronic maxillary sinusitis and polyps with asthma who tended to do less well.

The number of patients who believed that they had nasal polyps can be taken only as a rough indication of the incidence of polyps. Half of the 16 who reported polyps had this diagnosis or a diagnosis of chronic maxillary sinus disease made in our Otolaryngology Department in their student days.

Ragweed and *Alternaria* mold are our major allergens, and patients with either of these sensitivities seem to have had about the same chance of benefit from moving.

DISCUSSION AND CONCLUSIONS

Geographic information about prevalent allergens remains the best guide in predicting how a patient will fare in a new area. The important observation contributed by our patients is that, when there was prompt year-around improvement in a new locality, the improvement usually was lasting. This is a matter of practical importance in treatment. It is also somewhat unexpected if the atopic tendency to become abnormally allergic is maintained constantly throughout life. Studies of immigrants¹⁻² and of a new community³ show that only 20 to 30 per cent of the newly allergic population in these situations have had previous personal experiences with allergy or had close relatives affected. Rackemann and Edwards⁶, in their 20 year follow-up studies of 688 children with asthma, described 17 patients who were originally sensitive to danders who developed mild hay fever later on. They ask, "Was hay fever a new development or was the child slightly sensitive all the time but not sensitive enough for symptoms to result?" Only 2 of these 17 patients showed negative skin tests to ragweed or timothy at the time when they were first seen and tested. Cooke⁷ also observed that skin tests were sometimes positive before symptoms appeared. There do not seem to be many data in the literature about the frequency of clinically significant new allergy developing in atopic patients. From theoretical and practical points of view, it is quite important to decide whether the atopic response is caused by a set of circumstances that happens only once or only occasionally or whether continued susceptibility is always present.

The information provided by this study tells us something about young adult patients' experiences with moving, but well-planned prospective studies are very much needed. It should be noted that the people involved in this follow-up study are a selected population, in that they all were asthmatic and hay fever patients having symptoms in their student days. The true frequency of new allergy at various ages and the long-term effect of treatment as compared with moving all need much more reliable observation than any available in the literature to date.

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REFERENCES

- 1 Maternowski, C. J., and Mathews, K. P.: The prevalence of ragweed pollinosis in foreign and native students at a Midwestern University and its implications concerning methods for determining the inheritance of atopy, *J. ALLERGY* 33: 130, 1962.
- 2 Fine, A. J., and Abram, L. E.: The period of sensitization in immigrant hay fever patients, *J. ALLERGY* 31: 375, 1960.
- 3 Pineso, G., and Miller, H.: An unusual opportunity to make an allergy study of an entire community with the etiology and results of treatment, *J. ALLERGY* 1: 117, 1928.
- 4 Broder, I., Barlow, P. P., and Horton, R. J. M.: The epidemiology of asthma and hay fever in a total community, Tecumseh, Michigan. II. The relationship between asthma and hay fever, *J. ALLERGY* 33: 524, 1962.
- 5 Hagy, G. W., and Settipane, G. A.: Bronchial asthma, allergic rhinitis, and allergy skin tests among college students, *J. ALLERGY* 44: 323, 1969.
- 6 Rackemann, F. M., and Edwards, M. C.: Asthma in children: A follow-up study of 688 patients after an interval of twenty years, *N. Engl. J. Med.* 246: 815, 1952.
- 7 Cooke, R. A.: Allergy in theory and practice, Philadelphia, 1947, W. B. Saunders Company.