cated cases is discussed, and also the different procedures involved in contact cases and with premature infants.

The complications of vaccination have been estimated and the methods used for combating them are described. A personal view is submitted regarding the desirability of adhering to the recommended dosage. The infant mortality in this series is compared with the death rate in infants under 1 year for Belfast city.

In conclusion it is shown that since the introduction of infant vaccination with B.C.G. no anxiety has arisen and no major problems have had to be overcome. In addition, it is an admirable and simple way of further propagating information about the prevention of tuberculosis in a population which is already very conscious of the problem. There has been an excellent and increasing response to the introduction of B.C.G. among parents, and it has, in general, been warmly welcomed by practitioners and health authorities alike. It will be for posterity to judge the ultimate value of this preventive measure. A most careful follow-up of these cases is indicated.

I have to thank all my colleagues, obstetrical and paediatric, for their co-operation in this work, and particularly Professor F. M. B. Allen for his unfailing support and encouragement in the use of B.C.G. vaccine in Northern Ireland.

REFERENCE

- Gaisford, W. F. (1953). *Arch. Dis. Childh.*, **28**, 246.
Palmer, C. E., and Edwards, P. Q. (1953). *British Medical Journal*, **1**, 363.

CHANGES IN SKIN RESPONSE IN ASTHMA

A SKIN-TEST FOLLOW-UP OF ASTHMATICS

BY

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The use of skin-testing as a method of diagnosis in asthmatic patients, while generally accepted and more or less implicitly relied on by specialists in allergic disease, is still a controversial topic among general physicians and general practitioners. The idea of determining the sensitivity of the bronchial mucosa by applying the suspected agent in one way or another to the epidermis is to many somewhat fantastic. It is, of course, now generally recognized that allergic sensitivity is only one of the aetiological factors in the asthmatic reaction, but it seems to be equally widely agreed that it is an important one.

The disagreement comes when an attempt is made to assess just how important it is. The unbiased observer who nevertheless has some experience of the investigation and treatment of asthmatic persons would probably sum up the position by saying that it all depends. In some patients allergic sensitivity is the major cause of the symptoms; in some it is one among several equally important factors; and in others it is of no importance at all. In the present article this view is accepted as probably correct.

The survey and analysis presented are an attempt to contribute towards the answers to two questions: (1) What changes, if any, occur in skin reactions over

the years? (2) What is the significance, if any, of such changes (or, alternatively, the absence of any changes) in relation to the clinical progress of a series of asthmatic patients?

From a personal study of the literature, as well as from a careful search kindly made for me by the Library of the Royal Society of Medicine, it seemed that such a combined follow-up of a series of cases had not, so far, been carried out.

For some years I have conducted a special out-patient session, to which I can refer those persons suffering from bronchial asthma who attend my general out-patient morning session. This originated from experience of the chaos caused in a general out-patient clinic by an attempt to investigate and advise the asthmatic patient on the spot. Inevitably clinical material accumulates in such circumstances, and one is faced with the obligation to analyse it.

Skin-test Method

An early problem confronting anyone who attempts to do more than pacify the asthmatic and his relatives is the skin-test method. How important is it? What does it mean? At first I took the view that it probably had a place in the confirmation of allergic sensitivities suggested by the history of the case. I was warned that most people would show reactions, and that I would either be deceived or merely confused by the high proportion of positive results. It was therefore with some surprise that I found my difficulty to be the large number of negative results in patients with strongly "positive" histories. The potency of the solutions used seemed to be proved by the intensity of the reactions when they did occur.

Confidence in the method as a valuable aid to diagnosis naturally declined, and for a number of years relatively few patients were investigated in this way. However, clinical experience forced one to the conclusion that allergic sensitivity was a most variable quality, appearing, disappearing, and varying in an inconsequential manner, for which the skin-testing method could not be blamed; and it seemed worth while to see if this was clearly shown in the records of those cases which were available. About six years ago, therefore, a number of energetic skin testers, armed with a battery of syringes, were assembled, and those patients previously tested were summoned. The response was so poor that the survey did not yield any significant results.

It was therefore determined to carry out a minimum routine number of skin tests on every adult patient attending, and to repeat the follow-up testing on a larger series at a later date. This has just been done, and the results, though not as numerically valuable as was originally hoped, are interesting enough to warrant publication.

The actual testing was carried out by two independent observers, who also noted the patient's own assessment of his symptoms over the intervening years since the previous testing. I did not see the patients at all when they attended for this special purpose, and the observers who did see and test them took no part whatever in the original assessment, the original testing, or in the analysis.

The tests carried out in this series were group mixtures for the most part, including the common inhalant allergens (household dusts, clothing materials, pollen dusts, etc.), but excluding foodstuffs. Friedewald (1952), in a study of 1,900 cases, came to the convincing conclusion that skin-testing with solutions or other preparations of foods was so much waste of time. No apology is therefore made for the policy adopted in this connexion, nor is it thought necessary to go into all the arguments for and against the testing of foods by any method other than that of dieting.

The survey comprises only a small proportion of the total number of cases attending the special out-patient session, and indeed not many of those in whom skin tests had been

at one time made. Many patients did not attend the skin-testing sessions, which were arranged for the purpose of this investigation, saying that they were now well, did not require any further attention, and were afraid that any injections might cause a recurrence. A few complained that they were no better, and did not believe that they would receive any benefit from a repetition of the tests. The attendance of the "unimproved" group was generally good, however. There is thus some bias in favour of the unimproved cases as a whole; but this bias is not important for the present purpose.

Results

It is possible to survey the results in 209 cases, followed up over varying periods up to 17 years, the shortest period being two years, and the average seven years. This period is long enough to allow any variations in skin sensitivity to manifest themselves, and the number, though not large, has been found adequate for the immediate purpose.

Some general figures may be given before the general analysis is described. Of the 209 subjects available for analysis, 31 were under the age of 15, mostly between 12 and 14 (Table I).

TABLE I

Condition	No.	No. Under 15
Improved	138	25
Unchanged, or slightly improved	55	6
Worse	16	0
Total	209	31

It should perhaps be stated that improved means a very considerable change for the better—one quite outside the normal shift of symptomatic emphasis so often shown by the asthmatic person. For example, a patient must have been free of attacks for over a year, or have reached a state in which attacks of moderate or slight severity occur only occasionally. Lesser degrees of improvement are placed among the unimproved group, the changes being regarded as within the limits of normal variation.

Of the 209 cases, 21 had received "desensitizing" injections, 5 being under the age of 15. These 21 patients all showed a change in skin reactions from positive to negative shortly after the injections. It is of interest to note that the reactions had reverted to the original state in eight.

Thirteen of these cases were improved and eight unchanged or only slightly improved. These eight patients included five in whom the skin reactions had reverted to the original state.

In five cases a "combined" reaction was observed. By this is meant changes in both directions. Four of these were improved, and the remaining patient was unchanged. These five patients have been excluded from the analysis, leaving 204 cases to be classified. In 21 patients the result was difficult to place. In these, a change in one direction or the other occurred in some of the tests, but not in all. For example, a patient in whom the test was completely negative on the first occasion would yield a strong positive reaction to one or more pollen solutions at the final follow-up test, the other tests still showing negative results. In such a case the change in the pollen reaction was regarded as significant, and the case was placed in group 3 (— to +).

Another problem was presented by patients who yielded several positive reactions at the first test and who at the final test showed negative results to all except one of the formerly positive solutions. This type of change was somewhat of a puzzle as regards classification, and each case was judged separately on its merits. If the remaining positive reaction was a really strong one, then the patient was placed in the "unchanged" group, but if it was less convincing he would be placed in group 2 (+ to —).

All tests were carried out by the intradermal method, using a dose of 0.1 ml. A positive reaction means a definite weal of at least the size of a silver threepenny-piece, with pseudopodial irregularities and surrounding erythema. Any "weal" of smaller size, or one without pseudopodia or erythema, was disregarded.

TABLE II

Group	Results of Skin Tests	No. Tested	Clinical Progress		
			Improved	No Change	Worse
Group 1	No change	114	74 (65%)	31 (27.2%)	9 (7.0%)
" 2	+ to —	40	26 (65%)	13 (32.5%)	1 (2.5%)
" 3	— to +	50	34 (68%)	10 (20%)	6 (12%)
Totals		204	134	54	16

Table II shows the similar composition of the three groups when analysed according to clinical progress. There are, it is true, minor variations. For example, the percentage of patients whose condition had deteriorated over the period of study is highest in group 3 (12%) and lowest in group 2 (2.5%). The small total number of these worsening cases (16 in 204) makes any conclusion based on percentages of very doubtful validity, however. It will be noted that in this group, although the difference is slight, the improved cases also are relatively numerous.

The improved cases are of almost exactly the same percentage in each group, and those showing no significant change in either direction do not differ significantly from one group to another, although in group 3 there is the natural reflection of the higher numbers of improved and worse cases, in the lower relative proportion of the unchanged.

Discussion

It seems permissible to draw certain conclusions from the evidence that is here presented. In the first place, it is clear that the skin-test response is a variable quality, former skin sensitivity disappearing and new sensitivities arising as time goes on. This is in general accord with clinical experience in allergic conditions, although the correspondence between the clinical variations and the skin reactions is often far from close. The most common example of this divergence is the persistence of seasonable asthma long after the skin reactions to all pollens become negative. It is nevertheless evident that skin sensitivity is not a static quality.

Secondly, it is apparent that negative skin reactions may alter to positive in association with no corresponding clinical change, with well-marked improvement, or with deterioration; and that the chances of each of these variations occurring is about the same as it would have been had the skin reactions altered in the opposite direction or not at all. Skin-testing on the whole, therefore, seems to be an unreliable indication of clinical progress, and of little or no prognostic value.

The two questions posed at the beginning have therefore been answered by the survey and analysis which has been made.

It seems natural, and possibly useful, however, to consider briefly the relationship between allergic sensitivity in asthma and the skin-test response. It is recognized, as has already been stated, that allergic sensitivity is but one of the factors which influence the clinical progress of the asthmatic. The exact role of allergic sensitivity in this or, indeed, in any similar series cannot be stated with real accuracy, unless it may be assumed that the skin-test response is of pathognomonic significance in every case. Without such a "yardstick" the classification becomes too much a matter of personal opinion for reliable statistical analysis.

If skin sensitivity is accepted as the criterion it would seem that allergy was a dominant or important feature in a small minority of the cases in the present series; otherwise the

results would have been expected to show at least some significant correlation with the clinical condition of the patients.

It is true that this study does not provide enough evidence to enable one to judge the reliability of the skin-test response as an indication of allergic sensitivity in asthma; and the literature, vast as it is, does not give us a clear and unequivocal answer. It would, however, seem fair at least to say that the absence of any significant relationship of change in skin sensitivity to clinical progress in this series of asthmatic patients may not necessarily indicate that allergic sensitivity was an unimportant factor in the series as a whole, and that the skin response is perhaps not a completely reliable indication of allergic sensitivity. On the other hand, it must be said that in a number of cases skin-testing may give valuable and helpful information—always provided that its significance is judged in relation to all other available information.

Summary

The skin-test responses to the common inhalant allergens were followed in 209 asthmatic patients (of whom 31 were under the age of 15) over an average period of seven years, with extremes of 17 and 2 years, and were compared with the clinical progress of the patients.

The series was, as a whole, somewhat biased against the "improved" cases by the reluctance of asthmatic persons who were well to submit themselves to "repeat" skin-testing. This was not found, however, to affect the purposes of the survey and analysis.

Of the 209 cases, 138 were improved (no asthma for at least one year, or only occasional or moderate attacks at infrequent intervals), 55 were unchanged (or slightly improved), and 16 were worse.

The skin-test responses were found to have altered widely or significantly in 90 of the 209 cases.

These changes in skin sensitivity were found, however, to bear little or no relation to the clinical progress of the patients.

Skin-testing may not be a completely reliable indication of allergic sensitivity in general, but in the individual case it may give valuable information if used with discretion.

I am grateful to Dr. Christopher Strang and Dr. Michael Evans, who carried out the follow-up skin tests; to the Librarian of the Royal Society of Medicine and his staff, who kindly conducted a detailed research of the literature; and to Mr. Campbell, of the Department of Industrial Health in the University of Durham, who kindly checked the statistical analysis.

REFERENCE

Friedewald, V. E. (1952). *J. Allergy*, 23, 420.

The new neurosurgical theatres and extensions to the department of neurosurgery, which Sir Geoffrey Jefferson, F.R.S., opened at Frenchay Hospital, Bristol, last October, are now in commission. The theatres embody many modern improvements. Full air-conditioning on a plenum system has been installed, which provides 16 changes of air per hour, the intake being high above the roof and the air filtered. Glass-screened galleries help reduce aerial contamination by spectators, and allow a 70° angle of view on to the operation field. Communication with the galleries is by throat-microphone. The twin operating theatres share a common instrument store and sterilizing rooms; in the latter there are special arrangements to prevent excessive humidity. The department, which is the base for the neurosurgical service of the South-western Hospital Region, will ultimately have accommodation for 72 patients, including children.

INVESTIGATION OF AN OUTBREAK OF BOVINE TUBERCULOSIS IN A RURAL AREA IN LEICESTERSHIRE

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The *British Medical Journal* (1953) again drew attention to the importance of tuberculosis of bovine origin when it summarized in a leading article a survey undertaken by the Medical Research Council on this problem (Wilson *et al.*, 1952). The survey showed that tuberculosis of bovine origin still remains a serious problem. It was estimated that in 1944 there occurred 550 deaths in Great Britain from tuberculous meningitis and 1,050 deaths from other varieties of non-pulmonary tuberculosis due to infection by the bovine type of bacillus. It is realized that a survey at the present moment would not show such a high mortality, on account of the effects of streptomycin and P.A.S., but it is logical to assume that the amount of illness and disability from infection by the bovine bacillus still remains a very great problem. The survey showed that such infection occurred more often in children between the ages of 5 and 9 years. It was suggested that this could be explained by the fact that, whereas infants had previously been fed on cows' milk when breast-feeding failed, now, largely through the efforts of welfare clinics, they are fed on dried or other safe forms of milk, and it is when the child goes to school and moves around in other households that the possibility of infection from raw milk may arise. That leading article has stimulated us to report a recent survey which was undertaken in a rural Leicestershire area where there seemed to have been an abnormal incidence of tuberculosis associated with a known source of infection from a single cow in an otherwise healthy herd.

In January, 1952, notifications were received of two cases of non-pulmonary tuberculosis in children aged 9 and 5 living in the same village (Cases 1 and 2). Abdominal glands were evident in one and cervical glands in the other. The occurrence of these two cases in the same village at the same time led us to inquire from the chief county sanitary officer about the milk supply for these two households. It was found that both children were obtaining milk from the same source, and it was reported that on December 20, 1951, a routine biological sample of milk from this source contained tubercle bacilli. On December 22 a clinical examination of the herd was carried out by the divisional veterinary officer, and this revealed that a cow in the herd was suffering from tuberculosis of the udder. This cow was slaughtered under the Tuberculosis Order of 1938.

Since most of the children in this area were obtaining their milk from this known infected source, inquiries were made to find other children who might be suffering from tuberculous glands of the neck and other tuberculous conditions, and at the same time it was thought