PATCH-TESTING IN AN EAST COAST TOWN

BY

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For the last 20 years the majority of St. Andrews children have had a routine medical examination from birth. From 1920 to 1940 88% of all children born to permanent residents in the town were seen at the child welfare centre, while 55% of these attended the James Mackenzie Institute after they reached 2 years of age. In addition, some of those born outside the burgh and temporary residents in St. Andrews attend the clinics. The children are examined at the Institute three times a year until they reach school age, and thereafter once a year until they begin work. Information obtained from the family doctor, the school medical officer, and specialist services (ophthalmic, orthopaedic, tuberculosis) is added to the records. It is noteworthy that all classes of the community attend. Thus a proportion of the child life in St. Andrews, a seaside and holiday resort, is available for research.

Method

It was thought that it would be of value to discover what number of these children reacted to the Vollmer patch test (V.P.T.) for tuberculosis, and to try to relate the findings to clinical history and examination. Therefore, in 1941 the V.P.T. was added to the routine examination of all the children of whom we had a recorded history since birth.

The test consists in the application to the skin over the sternum, or on the back between the scapulae, of a strip of adhesive tape on which are three squares of gauze, the two outer squares having been saturated with old tuberculin and dried, while the central one is a control of dried glycerin broth. The skin must be thoroughly cleaned with acetone and allowed to dry before the patch is applied. The patch is left on for 48 hours, during which time it must not be allowed to get wet. Results are read 24 or 48 hours after removal of the patch. A positive finding is one in which the skin beneath the two outer squares shows a definite square of erythema. In strongly positive cases some vesiculation and a spreading of erythema occur, accompanied by itching.

In this investigation the result was read 24 hours after the removal of the patch, the child being visited at home for this purpose. Positive results were noted as one, two, or three pluses, according to the degree of the reaction—a pink square being +, a deeper red with slight raising of the skin ++, and a definite vesiculation and an erythema spreading from the site of the original square +++. The proportion of the degrees of reaction was 46% +, 26% ++, and 28% +++. Some attempt was made to assess the importance of the degree of reaction.

With regard to the reliability of this test for tuberculosis, Vollmer (1940) reports that ten different investigators made comparative studies of 4,285 cases and found 1,114 positive reactions to the patch test, as compared with 1,119 positive reactions to the Mantoux test; but other workers have not confirmed this degree of accuracy. The majority of reports indicate that the patch test is accurate in 95 to 98% of young patients (*B.M.J.*, 1942, 2, 101).

Results

Five hundred patches were obtained direct from New York through the courtesy of Messrs. Lederle, and results from 487 children aged from 2 to 16 years were obtained. Four children were examined twice, and nine patches were spoilt through being removed too soon. Refusal to allow the test was met with in only three instances.

There were 340 (69%) negative and 151 (31%) positive results in the 491 examinations. Of the four re-examined children who were originally negative three had become positive and one remained negative. Table I shows the numbers and results at different ages. In all positive cases an attempt was made to find the source of infection, and the work was linked up with that of the family doctor and the tuberculosis officer. St. Andrews is well supplied with T.T. milk, but a large proportion of the population use non-T.T. or unpasteurized milk.

TABLE I.—Showing Age at Examination of St. Andrews Children and Results of the V.P.T.

Year of Age:	2	3	4	5	6	7	8	9	10	11	12	13	14	14+	Total	%
V.P.T. neg.	16	68	38	32	35	22	23	25	17	15	17	13	5	14	340	69
„ pos.	1	12	12	16	7	9	12	13	17	10	11	6	9	16	151	31
Total ..	17	80	50	48	42	31	35	38	34	25	28	19	14	30	491	

Out of 500 possible tests, 9 were spoilt and 491 completed on 487 cases.

If these children are grouped in ages it will be seen that the percentage of positive results rises with age:

(a) Up to and including 5 years (195 children)		21% positive
(b) 6-10 years (180 „)		32% „
(c) Over 10 years (116 „)		45% „

These percentages of positive reactors are slightly higher than those recorded by Crowe (1942) in percutaneous and Mantoux tests carried out mostly on dispensary patients who were considered free from active tuberculosis. Gilchrist *et al.* (1942) found 36% of positive reactions to a patch test in 385 adolescent boys who volunteered for the Air Training Corps. Shaw (Price, 1942), Belfast Tuberculosis Dispensary, using P.P.D. in two strengths, examined 1,634 contacts and non-contacts, aged from 1 to 14 years, and had 34% positive reactors.

The histories of the four children who were re-examined with the V.P.T. are as follows:

Case 1.—This boy, aged 4, negative Jan., 1942, was subsequently in close contact with a grandfather who died of pulmonary tuberculosis; in June, 1942, the child developed pleurisy, and was positive (+++) to the V.P.T. He has done well with sanatorium treatment.

Case 2.—This child, aged 5, was negative in Oct., 1942. He was x-rayed because his younger sister and older half-brother were positive reactors, and he had moist rales and a few rhonchi. The x-ray report was: "Definite enlargement of hilar glands with shadows spreading from root into right upper lobe, very suggestive of early infiltration of the lung." The child then developed measles and bronchopneumonia. In March, 1943, the V.P.T. was positive (++) and the x-ray report was: "The enlargement of the glands at the lung root is less marked, but there is now a definite lesion of the right upper lobe. The lower interlobar septum is well defined, and the appearances suggest there has been a small interlobar effusion." He had gained 4½ lb. in weight, had "never lost his appetite" in the five months, and looked well.

Case 3.—Aged 6, this boy was negative in June, 1941. His nutrition was only fair, and he had had a febrile attack three months previously. In March, 1942, the health visitor found him with a temperature and referred him to his family doctor. He was off school for a month, and was not seen again at the Mackenzie Institute until June, 1942, when clinically he had tuberculosis of the left lung and the x-ray report was: "Some enlargement of root glands with commencing calcification. There is a small area of infiltration in the left upper lobe." The V.P.T. was positive (+++). He has done very well with sanatorium treatment.

Case 4.—This patient had a history of infantile eczema and asthma. He was negative in July, 1941, and a few months later developed cervical adenitis, which required operation. The surgeon considered the glands tuberculous, but the V.P.T. was negative in April, 1943.

Radiography

An x-ray examination of the chest was made in 131 of the 151 positive reactors; the remaining 20 were working and unable to attend, had left the town, or their parents refused to allow x-ray examination. Dr. B. W. Anderson, deputy county medical officer for Fife and acting tuberculosis officer for East Fife, has kindly examined the films and classified them in Table II.

TABLE II.—Results of X-ray Examinations in 131 Children with Positive Reactions to the V.P.T.

Cases	Tuberculous Lesion of Lungs or Pleura	Require Further Observation	Calcified Primary Focus	Enlarged Hilar Glands	Calcified Nodes	Normal Limits
131	5 (3.8%)	14 (10.7%)	1 (0.8%)	8 (6.1%)	41 (31.3%)	62 (47.3%)

Sixteen negative reactors were also x-rayed, and the films were classified. One showed calcified nodes, two had enlarged hilar glands, and the remaining thirteen were within normal limits. It was realized that sixteen was a totally insufficient number for a control group. The ideal would have been to

x-ray the whole 487 children. Of the five children showing definite tuberculous lesions, one, aged 3 years, came for routine examination; her mother said she had "seemed tired the last few weeks." The V.P.T. was strongly positive, and x rays revealed miliary tuberculosis. She died three weeks later. Another, aged 7, had close contact with his tuberculous father, who died in 1941. The remaining three are Cases 1, 2, and 3, mentioned above.

Housing

The housing of the children is shown in Table III under categories A (good), B (fair), and C (poor). The classification of the houses was made by the public health authorities. In the quinquennium 1921-5 only 41% of St. Andrews children were born in "good" houses; but 628 new houses have been built since that time and a number of old houses reconstructed. It will be noted that, out of the total of 487 children examined, 456 (94%) were well housed at the time of this investigation, and that therefore only 31 (6%) children living in B or C houses were examined with the V.P.T.

TABLE III.—Housing

	A	B	C	Total
Negative reactions ..	313	20	3	336
Positive ..	143	7	1	151
Total ..	456	27	4	487

Combining B and C, a fourfold table gives: $\chi^2 = 0.199$; $P = 0.66$. There is therefore no significant difference between the housing of the two groups.

Morbidity

The mass of data available in each child's record, which is complete from birth, made it difficult to select points in the case history suggestive of tuberculosis. Also, the range of age of the 487 children—from 2 to 16 years—renders any analysis of little value statistically. However, it may be of interest to record that the case histories were examined under the following headings: (i) contact with notified or suspected pulmonary tuberculosis; (ii) respiratory disorders of a degree of at least two attacks of bronchitis or one of pneumonia; (iii) febrile attacks; (iv) operation on cervical glands; (v) poor nutrition; (vi) allergy; (vii) negative to i-vi. The findings are given in Table IV.

TABLE IV.—Showing Morbidity in 487 Children examined with the V.P.T.

No. of Cases	i Contact	ii Respira- tory	iii Febrile- cula	iv Gland Opera- tions	v Poor Nutri- tion	vi Allergy	vii Record Neg. for i-vi
V.P.T. neg., 336	50 (15%)	22 (6.5%)	10 (3%)	5 (1.5%)	22 (6.5%)	11 (3%)	233 (69%)
V.P.T. pos., 151	32 (21%)	19 (12.5%)	12 (8%)	5 (3%)	11 (7%)	13 (9%)	81 (54%)

As would be expected, the morbidity is higher in the positive reactors, but it should be noted that 81 (54%) had none of the above signs or symptoms suggestive of tuberculosis. The consensus of opinion is that one cannot differentiate human and bovine infection by tuberculin tests. The fact that five negative reactors had had cervical gland operations strengthens the impression that the V.P.T. does not react so well to bovine infection. Also, one of the children examined was proved bacteriologically to have a bovine infection of lung and kidney, and she was a negative reactor.

Summary

The investigation was undertaken as a specific piece of research on the lines of the original aims of the James Mackenzie Institute "to investigate disease before the occurrence of any structural change in any organ of the body, with a view to providing a diagnosis at a period earlier than is possible by the methods now in use, and in order to obtain a knowledge of the circumstances that favour the onset of disease."

Four hundred and eighty-seven children in a seaside and holiday resort were examined with the Vollmer patch test for tuberculosis, and 31% gave a positive reaction. The children were unselected except for the fact that all had health records from birth. Their housing conditions are tabulated. An analysis is given of the x-ray

films of chests in 86% of positive reactors. An attempt has been made to compare morbidity of positive and negative reactors.

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SULPHAGUANIDINE IN THE TREATMENT OF FLEXNER DYSENTERY

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The treatment of dysentery with sulphaguanidine has not gained the measure of approval accredited to the use of the other sulphonamides in many other infections. At least at this hospital the results were not entirely conclusive, although it is true that the majority of cases were of the Sonne type, against which sulphaguanidine is said to be less effective. It should be appreciated that any antibacterial agent is set a severe task when endeavouring to "sterilize" the bowel. The total length of the gut, its further increase in surface area by the throwing up of mucous membrane into folds, together with the dilution of the drug in faecal contents of the bowel, present a major problem in an attack on all parts of the intestine. It was thought that success might follow the administration of relatively large doses of sulphaguanidine, which, by reason of the poor absorption of the drug, would result in a high concentration of the presumed bacteriostatic agent throughout the bowel.

The Investigation

The admission of 44 young female adults, ranging in age from 17 to 37 years (average 21), suffering from Flexner dysentery has given an opportunity of testing the effects of large doses. Unfortunately, when the early admissions were made it was not suspected that such a large number of patients would arrive ultimately, otherwise a controlled observation would have been planned. Certain points, however, make the results worth recording. Of the patients only ten had a record of diarrhoea before admission. The remainder were symptomless contact carriers. Five had received sulphaguanidine before admission, but not more than 10.5 g. During the period in hospital the only clinical manifestations reported were transient blood and mucus in the stools in four and mucous stools in two cases.

Dosage.—The total amount of sulphaguanidine was 142 g., given orally, over 10 days as follows: 24, 24, 24, 18, 18, 9, 9, 6, 6, and 4 g. A number of patients developed a toxic rash (described below), whereupon the drug was stopped; but in no

Graph showing sulphaguanidine blood levels.

case did any patient receive less than 129 g. in all. The level of sulphaguanidine in the blood was estimated for each day by random selection. Only one specimen of blood was withdrawn from most of the patients, but in some a second estimation