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The Convenience of the Heaf Method for Tuberculin Testing

BY

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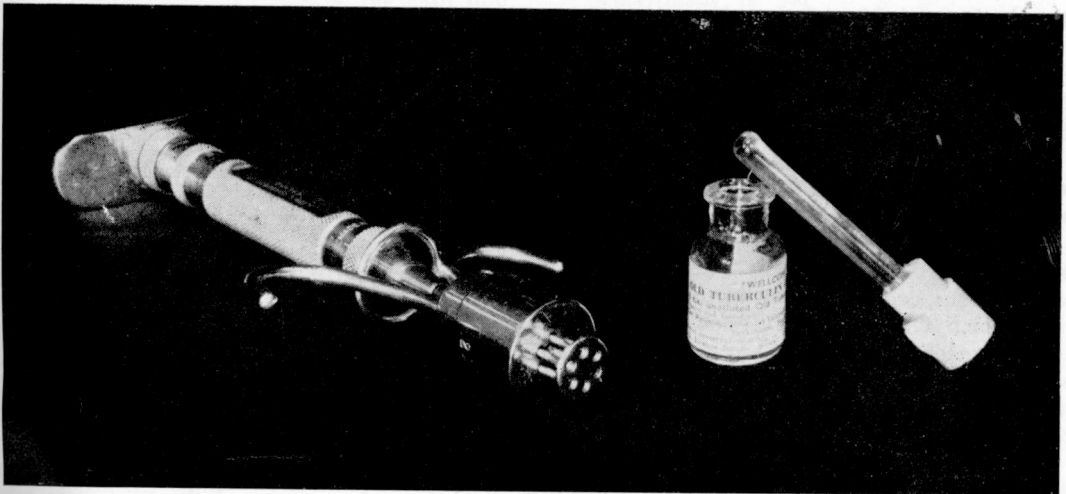
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Testing hundreds of African school children for their experience of tuberculosis and need for B.C.C. vaccination may be a worthy task, but to do so with an intradermal injection of rather unreliable fluid and to measure the result in twenty-fifths of an inch (mm.s) did not appeal to us in the Midlands. So we considered the

THE TESTING METHOD

The test was done with undiluted O.T. tuberculin. The skin of the left forearm was cleaned with methylated spirits (not acetone) and the tuberculin applied with a glass rod when the skin was dry. The multiple puncture was made through the drop with the instrument set at 2 mm. Nothing else was done. The instrument was flame-sterilised between schools, but not between pupils. The battery of needles was re-sharpened by the firm, as recommended, after about 3,000 tests. One of our instruments began to misfire after about 10,000 tests, but was easily repaired.



The Heaf multiple puncture machine, with bottle of tuberculin (undiluted) and glass rod.

Heaf multiple puncture apparatus for the purpose and resolved to adopt it for tuberculin testing. A B.C.C. programme would be easier to face up to with one instead of two intradermal injections. The positive reactors would be easily and rapidly eliminated by the multiple puncture; only the negatives would demand the needle and syringe for vaccination.

IS THE METHOD RELIABLE?

Prof. F. R. G. Heaf, of the Welsh National School of Medicine, described the method and used undiluted tuberculin (Heaf, 1951). He regarded it as a simple, painless and rapid tuberculin test, although the puncture marks may take months to disappear.

It has been recommended for epidemiological use as a single test. After testing school children in England and using protoderm instead of undiluted tuberculin, the following conclusions were reached (Report, 1958):

1. There was a high degree of agreement between the Heaf and the Mantoux 5 T.U. test.
2. A blister reaction occurred as often in one as the other, namely, Heaf 5.8 per cent. and Mantoux 4.7 per cent. of 1,195 tests.
3. The Heaf test was regarded as the easiest to read and the easiest to perform.

Another comparison of the two tests was arranged by reading them at two, five and seven days in young soldiers in New Zealand, with the following results:

COMPARISON OF HEAF AND MANTOUX TESTS
(De Hamel, 1957)

	Two Days	Five Days	Seven Days
Number read	220	212	208
Negative to Mantoux 20 T.U.	117	114	104
Negative to Heaf mg. P.P.D./ml. ...	116	111	102

The Heaf was held to have advantages over the Mantoux, in that it was rather more sensitive, gave less discomfort and could be adequately read between the third and seventh days.

The two methods were used for post-vaccination tests in England and gave identical results (Ministry of Health Memorandum, 1958). The Mantoux was a 10 T.U. dose of O.T.

A carefully designed trial of the reliability of multiple puncture tests (Stewart *et al.*, 1958) revealed an unsuspected variation in the technique of giving the 5 T.U. Mantoux. It could affect the size of the reactions and the percentage of positives. With the Heaf, however, having different testers did not significantly affect the percentage of positive reactors. In their opinion the Heaf technique using protoderm was the most satisfactory of the three methods for routine use. (Their third method was freeze-dried B.C.G. for the test.) The merits of the Heaf were:—

1. Simple equipment.
2. Easy administration.
3. Relative low costs of materials and replacements.
4. Less affected, by the tester, than the Mantoux.

RECORDS AND RESULTS

Twenty thousand African school children were tested in the latter six months of 1958 in

the Midlands. No punch cards were got because it was a mass effort and it would be the impression in five to ten years on T.B. morbidity that mattered. The class registers of children were marked in the beginning, but were ultimately put on one side because the only facts required were the number of tests read, the reading and the age group. Untested children turned up at the reading for vaccination, but did not deceive the reader, because the puncture marks are still there in a negative. Dyes were tried, but had gone by the fourth day on an African skin. The reading was usually on the fourth, sometimes the fifth, day, in direct sunlight. Some results are given below.

UNVACCINATED SCHOOLS

Standard	Positives	Total Read	Per Cent. Positive
A	707	2,737	26
B	761	2,294	33
I	619	1,767	35
II	485	1,201	40
III	408	900	45

VACCINATED SCHOOLS (BY GRAHAM IN 1954)

Standard	Positives	Total Read	Per Cent. Positive
A	247	852	29
B	264	707	37
I	314	591	53
II	294	453	65
III	249	325	77

The children enter school at any old age, and they come and go, but Standard "A" averaged seven years. Standard III were not 11 years, but rather an average 13 years. At all events, the entry age in African schools is becoming settled at six years, and the tuberculin rate of these children will always be a useful guide to the prevalence of tuberculosis in the neighbourhood, provided B.C.G. has not been done in their pre-school days.

OTHER CONVENIENCES OF THE HEAF

The test can be done at short notice—that is to say, the instrument and glass rod take no time to flame and the bottle of undiluted tuberculin is ready and up to strength at all times.

Undiluted fluid keeps for at least a year unopened and there is no evidence that it deteriorates within a fortnight of opening. On the other hand, there have been reports that dilutions of tuberculin can be unreliable, particularly towards the bottom of the ampoule. Strengths of commercial preparations of P.P.D. have been queried (Transactions of the Seventeenth Conference, 1958).

This preparedness with the Heaf lets us do testing in out-stations. Are the sisters and orderlies "positive" before they are sent to duties on the ever-increasing T.B. wards? Has this African baby got a primary complex, and has that European adolescent been infected by his father's illness? The tuberculin test will be asked for oftener if it is easily available.

The degree of the reaction is easily read, but it is as well to remember that it is an allergy and severe reactions have little relation to active disease. "It is difficult to decide how such reactions can be interpreted" (Lester, 1958). An interesting development of the multiple puncture in the future will be its use with a depot P.P.D. cream (Pepys *et al.*, 1958). The cream (Eucerin) is deposited in the skin and remains there as a warning system for naturally occurring infection in non-reactors not B.C.G. vaccinated.

In practice, tuberculin testing has been a prelude to B.C.G. vaccination a few days later. A team cannot walk into the schools and start off testing; a certain amount of time is lost, and lost to advantage, in polite introductions and in explanation of what is to happen and of tuberculosis propaganda in general. It takes

time, but it is time that can be spared, on the first visit, if the Heaf is used and not the intradermal Mantoux.

SUMMARY

The Heaf multiple puncture tuberculin test was employed in the Midlands, Southern Rhodesia.

The method is described and the materials photographed and its comparison with the intradermal Mantoux discussed.

Some results of the test in African schools are given and further advantages of the method mentioned.

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Addendum

We now use a self-firing machine and P.P.D. Weybridge tuberculin, as described by Stewart *et al.* in *Tubercle*, Lond. (1959), 40, 251.