as a breech or a vertex must be taken into account when comparing these results with a series of breech deliveries. Of previous publications on the foetal risk in breech delivery one of the most important is by Lloyd Woodrow Cox (1950), of Liverpool, whose figures must be regarded as a challenge to the low foetal risk of version under anaesthesia. Cox gives a foetal mortality rate for uncomplicated breech delivery in Liverpool for the past 16 years as 4.98%, and 3.2% for the past five years. We lost six infants from a total of 214, three due to version, one from toxæmia, one from post-maturity, and one from shoulder dystocia. If we regard the death from toxæmia as "complicated" this gives the final foetal mortality as 2.3%, which compares favourably with the Liverpool figures. Cox has also shown that for infants over 7½ lb. (3.4 kg.) the foetal mortality for a breech delivery is 10%; in our series 30.3% of the infants born weighed over 7½ lb. (3.4 kg.).

It is clear that in achieving the excellent figures for breech delivery in Liverpool the caesarean section rate is exceptionally high. Version under anaesthesia definitely lowers the caesarean section rate, as a trial of labour may be safely conducted in suspected disproportion, and this usually results in a normal or forceps delivery. Moreover, the majority of breeches can be turned easily in the antenatal clinic without anaesthesia and we can see no reason why the same success cannot be achieved as when anaesthesia is used; indeed, in all probability it will be greater. We do not agree, therefore, with the Liverpool school, who make "no particular effort to avoid this (breech) presentation" (Cox, 1950), but hold to the view that prevention is better than cure, and it is submitted that the results of this series justify that view.

It might be concluded from these figures that version under anaesthesia should be largely confined to primigravidae, and we incline to this view. We believe that it should be possible to attain an 80% success rate, with a foetal mortality of *nil* or thereabouts attributable to the version, and that the results so obtained cannot be equalled for breech deliveries in primigravid patients in whom version using anaesthesia has not been attempted. Furthermore, it is safe for a version to be performed and for the mother to have her baby at home under the care of her family doctor, thus dispensing with admission to hospital necessitated by a primigravid breech delivery.

Those hospitals that have a high incidence of primigravid breech deliveries and in which version under anaesthesia is not practised should consider whether by adopting this procedure they can reduce unnecessary stillbirth and neonatal deaths.

Summary

An analysis is given of 214 cases of external cephalic version under anaesthesia. The foetal mortality rate due to the version was 1.4%. Two cases were subsequently lost in labour, giving a final corrected foetal mortality rate of 2.3%. Previous attempts at version without anaesthesia had been unsuccessful in all cases. Version with anaesthesia succeeded in 81.3%.

It is concluded that the number of successes obtained and the low foetal risk justify using this procedure as a routine antenatal measure, thus reducing the stillbirth and neonatal wastage from breech deliveries.

We should like to express our thanks to Miss M. A. M. Bigby for permission to include her cases.

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MASS B.C.G. VACCINATION IN 'A BRITISH COLONY

BY

A. W. W. ROBINSON, M.D., D.P.H.

Surgeon Commander, R.N.

In Singapore resistance to disease was greatly reduced during the years of enemy occupation, 1942–5. This was particularly true of pulmonary tuberculosis. The local population were deprived of rice, their staple food, and local agriculture was quite incapable of producing an adequate substitute. In addition to starvation, heavy labour conditions, crowded living accommodation, mental depression, and fear all helped to increase the incidence of disease.

In August, 1948, the Health Department in H.M. Naval Base inaugurated a medical service in the Dockyard Asian School, which has a roll of between 500 and 600 children. The naval medical officer of health felt that regular medical examinations of these Asian children would be of use in the early detection of malnutrition, skeletal maldevelopments, and clinical conditions such as tuberculosis, and also that these children should be educated in the elements of health and hygiene.

When the school medical service had been established on a regular basis it was decided to submit the children to a tuberculin test, using the diagnostic jelly of Messrs. Allen and Hanburys. This contains 95% of old tuberculin. The technique employed was to clean with ether an area of skin on the lateral side of the arm. The test and the control jellies were applied to this area in the shape of a diamond, the lower V of which was the test jelly, and the area was covered with a piece of adhesive plaster. There was no preliminary rubbing of the skin with flourpaper. Tests were read at three days and daily until seven days after testing. A positive result was recorded only when there was a reaction of at least five papules or vesicles, or when a raised weal showed on the skin. There were no reactions from the control jelly. Of 574 children tested in this way 52 were not read. Of the remainder, 47 (9%) were positive-reactors and 475 (91%) were negative. The positive-reactors were then submitted to a chest x-ray examination. None showed evidence of active disease, but all had healed lesions.

Discussion of our results with the Singapore Anti-Tuberculosis Association led to their offer of co-operation if we wished to avail ourselves of B.C.G. vaccination. It was arranged that they would provide the vaccine free of charge and would instruct us in the technique

of vaccination, while the Naval Health Department would carry out the preliminary testing, do the bulk of the vaccinations, and retest the children some eight weeks later. It was also decided to widen the scope of the operation by including all the Asian children within the naval base whose parents wished to have them vaccinated. The response far exceeded anything we had hoped for.

Preliminary Tuberculin Test

Working on seven afternoons, we applied the tuberculin-jelly test to 2,684 children, whose ages ranged from 2 months to 16 years. The following modified technique was used. An area of skin between the scapulae was cleaned carefully with ether, and then stroked firmly with fine flourpaper. The jelly was placed on the skin so treated in the form of a V, and the area was then covered with a piece of adhesive plaster 2 by 1 in. (5 by 2.5 cm.). We did not use the control jelly supplied, as we had had no reactions with this jelly during our previous tests. To lessen the work, and because we were not in any sense carrying out a controlled experiment, we felt justified in discarding it. The parents were warned not to allow the patch to get wet during the next 48 hours, and were instructed to bring the children back again after 72 hours to have the test read.

Results of Tuberculin-testing

The results of the test are given in Table I.

TABLE I.—Results of Preliminary Tuberculin Test

Age in Years	No. Tested	No. Positive	No. Negative	Result Not Known	Percentage Positive of Known Results
0—	468	18	426	24	4.1
2—	526	38	463	25	7.6
4—	302	58	228	16	20.3
6—	312	82	215	15	27.6
8—	376	138	219	19	38.7
10—	358	139	202	17	40.8
12—	254	115	126	13	47.7
14—	81	33	44	4	42.9
16+	7	3	3	1	50.0
Total	2,684	624	1,926	134	24.50

We read the tests at the end of the third day only, not daily to the seventh day as recommended by the manufacturers, as in the first series of tests we had found that children who were negative on the third day never afterwards became positive when read daily. To ensure uniformity in estimating what constituted a positive reaction, the naval medical officer of health alone read the results. Among the 2,684 children tested were 498 dockyard schoolchildren who had been included in our first series of tests. With the flourpaper technique the results were: positive 215 (43.2%), negative 283 (56.8%);

to be contrasted with 9% and 91% respectively with the simpler technique. The relationship between positivity and three-year age groups is shown in Table II, from which it will be seen that there are no very marked differences between one race and another.

In absolute numbers, and in all races, there is a marked preponderance of children of ages up to and including 3 years over the groups which immediately follow. There were 994 at ages 0 to 3 years inclusive, compared with 614 at ages between 4 and 7 years inclusive. This may be due to chance, but possibly indicates excessive mortality among babies and young children during the Japanese occupation. Positive reactors were found in every age group and the positive proportion of each three-year group rose steadily with age.

The B.C.G. Vaccination

There was an unavoidable delay of 11 weeks between the completion of the tuberculin-testing and the first vaccination. This interval must prejudice the conversion figures, since a number of negative reactors may have become positive in the interim. The number doing so is, however, probably quite small—1.1% as calculated by working out the fractional increase for 11 weeks on the highest percentage increase in the proportion positive in Table II—namely, 15.3% from the 3— to the 6— age group. The vaccine was made up for use by alternately filling and withdrawing from the ampoule 2 ml. of sterile distilled water. The dried vaccine readily became suspended after 15 to 20 charges and discharges of the syringe. An area of skin on the lateral side of the arm was cleaned first with spirit and then with ether. Three drops of vaccine suspension were placed separately on the area of cleaned skin and were spread out. A cruciate scratch was made through each drop with a triangular, straight surgical needle. This scratch was made boldly so as to draw a very little blood. With the side of the needle the vaccine (usually admixed with a little blood) was spread up and down through the three incisions. When the vaccine had dried a piece of adhesive plaster was used to cover the area of vaccination.

We employed four teams of two persons. A team was able to deal with 60 children an hour, and our daily average of vaccinations was about 700. Of the 1,926 children who were found to be tuberculin-negative, we succeeded in locating and vaccinating 1,809. The other 117 had left the naval base in the period between testing and vaccination. There were no adverse reactions of any kind after vaccination. Those who became positive as a result of the vaccination often showed a reaction at the site analogous to that seen after successful vaccination against smallpox. There were no slow-healing ulcers of the kind described in the literature.

TABLE II.—Results of Preliminary Tuberculin Test

Age in Years	Malays				Chinese				Indians				Total (All Races)			
	No. Tested	No. Pos.	No. Neg.	% Positive of Known Results	No. Tested	No. Pos.	No. Neg.	% Positive of Known Results	No. Tested	No. Pos.	No. Neg.	% Positive of Known Results	No. Tested	No. Pos.	No. Neg.	% Positive of Known Results
0—	160	10	150	6.3	185	4	181	2.2	391	23	368	5.9	736	37	699	5.0
3—	80	13	67	16.3	225	29	196	12.9	188	35	153	18.6	493	77	416	15.6
6—	61	16	45	26.2	228	75	153	32.9	186	56	130	30.1	475	147	328	30.9
9—	60	19	41	31.7	227	92	135	40.5	230	98	132	42.6	517	209	308	40.4
12+	42	23	19	54.8	159	81	78	50.9	124	47	77	37.9	325	151	174	46.5
Total	403	81	322	20.1	1,024	281	743	27.4	1,119	259	860	23.1	2,546	621	1,925	24.4

N.B.—Four Eurasian children have not been included.

Results of Vaccination

The tuberculin-testing of the vaccinated children to establish the conversion rate was begun eight weeks after the vaccination (the period recommended by the Pasteur Institute). Of the 1,809 children vaccinated we were able to locate and retest only 1,419, the other 390 having disappeared from the base. It must be explained that throughout the whole operation some children fell away at each step of the proceedings.

The same technique of tuberculin-testing was used, and of 1,419 tested, 743 (52.4%) were positive and 676 (47.6%) negative. If we regard as reasonable the

TABLE III.—Retesting of Vaccinated Children

Age in Years	No. Tested	No. Positive	No. Negative	Result Unknown	Percentage Positive of Known Results
0-	394	147	173	74	45.9
2-	435	182	181	72	50.2
4-	211	82	93	36	46.8
6-	204	82	82	40	50.0
8-	205	85	65	55	56.6
10-	196	89	42	65	67.9
12+	164	76	40	48	65.5
Total	1,809	743	676	390	52.4

increase of the proportion positive with age (Tables III and IV) tends to confirm this suspicion. (d) The vaccine may not have been rubbed into the arms thoroughly enough with the edge of the needle. The faults sprang from inexperience in vaccinating and (more especially) from trying to do too many children at one time.

Summary

The high incidence of tuberculosis amongst Asian children is noted, and some causes are suggested.

The steps in tuberculin-testing a large number of children of all ages are given; and the age grouping of the results is discussed.

The vaccination of 1,809 children of all ages with dried B.C.G. vaccine is described in detail.

The results of this vaccination, found to be a change from a negative to a positive tuberculin reaction in 743 children, are discussed, and reasons are suggested why this conversion rate was not higher.

I am grateful to Dr. G. H. Garlick and Dr. A. Bardsley, of the Singapore Anti-Tuberculosis Association, for the immense help they gave so willingly; to my wife and other European ladies who helped in the testing and vaccinating, often under considerable difficulties; to the Captain of the Dockyard and the Officer Commanding, Royal Naval Police, for their interest and help; to the staff of the Naval Health Department, Singapore, who (both Asian and European) worked so hard to make the campaign a

TABLE IV.—Retesting of Vaccinated Children

Age in Years	Malays					Chinese					Indians					All Races				
	No. Tested	No. Pos.	No. Neg.	Result Not Known	% Positive of Known Results	No. Tested	No. Pos.	No. Neg.	Result Not Known	% Positive of Known Results	No. Tested	No. Pos.	No. Neg.	Result Not Known	% Positive of Known Results	No. Tested	No. Pos.	No. Neg.	Result Not Known	% Positive of Known Results
0	133	44	39	50	52.0	176	76	73	27	51.0	343	125	171	47	48.8	653*	246*	283	124	46.6
3-	56	27	11	18	71.0	188	87	83	18	51.2	143	51	70	22	42.1	387	165	164	58	50.0
6-	41	12	15	14	44.5	146	69	55	22	55.6	122	47	41	34	53.4	309	128	111	70	53.5
9-	40	10	5	25	66.6	133	70	33	30	68.0	123	48	40	35	54.5	296	128	78	90	62.1
12+	17	8	4	5	66.6	76	44	19	13	70.0	71	24	17	30	58.5	164	76	40	48	65.5
Total	287	101	74	112	57.8	719	346	263	110	56.8	802	295	339	168	45.6	1,809	743	676	390	52.3

* 1 Eurasian child added.

supposition that, of the 390 children vaccinated but not subsequently retested, 52.4% also become positive, we ended our campaign with a total of $743 + 204 = 947$ children protected against tuberculosis. The results are shown in Tables III and IV.

The conversion rate was admittedly disappointing. Rydén (1946) reports 99% reactors from a series of 7,475 vaccinated. Only 3 of the 65 non-reactors failed to become positive after revaccination. Birkhaug (1944), in his series, obtained 97 to 98% reactors after four to six weeks. He used a multiple-puncture technique. Hertzberg (1946) reports that of 13,515 vaccinations in Norway during 1943 95% became reactors. From these figures, and from other sources, we must infer that our reactor percentage was a poor result for the work done. We think there are four reasons for this: (a) The dried vaccine may not always have been completely suspended, and some may have been left in the ampoule. We found in a subsequent series of vaccinations on European children that great care had to be taken to ensure complete suspension. (b) The cruciate scratches were often not made deep enough. (c) We felt certain that with a large number of the children the vaccine was not allowed to dry properly before the site was covered with gauze and plaster. We also suspected that many mothers wiped away the vaccine from their children's arms—a normal action when the vaccine was blood-stained. The more or less steady

success; and to Dr. John Knowelden, of the Department of Medical Statistics, London School of Hygiene and Tropical Medicine, for his invaluable advice. I wish to acknowledge with thanks the permission of the Medical Director-General of the Navy to submit this paper for publication.

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A warning to parents to keep medicines locked up and out of the reach of children was recently given by the Preston district coroner. Recording a verdict of "Accidental Death" on a 2-year-old child who died from strychnine poisoning as a result of swallowing tablets prescribed for her mother, the coroner said he wanted to make one or two observations on the case. The pills had been kept on the sideboard, behind the clock, presumably out of the child's way, but she had found them, opened the box, told her mother she was eating toffee, and had swallowed the pills, no doubt thinking they were toffees. He said he wanted to emphasize the fact that nowadays there were going into the homes of many people medicines which were poisonous. They were not poisonous if taken in accordance with the doctor's prescription, but dangerous if not so taken, and extremely dangerous to children. He suggested that boxes of toxic pills should be labelled dangerous unless used strictly in accordance with the doctor's prescription, and also that they should be kept out of the way of children.