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## BCG VACCINATION IN THE REPUBLIC OF PANAMA

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The first vaccinations against tuberculosis in the Republic of Panama were performed in December, 1948, as part of a study being carried out at the Gorgas Memorial Laboratory.<sup>1</sup> Shortly afterwards, in January, 1949, a BCG Vaccination Service was established by the Panamanian Government in collaboration with the Gorgas Memorial Laboratory. The writer was director of the Service from January, 1949, to November, 1951. This paper summarizes the experiences during that period.

Based on preliminary surveys showing a very high percentage of reactors to tuberculin among adults, only children under fifteen years of age were, as a rule, included in the program. Special adult groups, such as the student nurses of the National School for Nurses, were admitted.

For the prevaccinal testing, a first dose containing 0.00002 mg. of purified protein derivative (PPD) and a second dose containing 0.005 mg. were used. Infiltration of less than 6 mm. was at first recorded as negative. However, when this reaction was elicited by the injection of the first dose and a second dose was administered, a very strong reaction, in most cases necrotic, was obtained. For this reason, reactions to the first dose showing definite infiltration of 3 to 5 mm. were then recorded as doubtful and, in these cases, an intermediate dose corresponding to one-half of the second dose (0.0025 mg.) was injected instead of the whole second dose. A percentage of 91.0 of the doubtful reactions to the first dose was positive to 0.0025 mg. of PPD.

The prevaccinal tuberculin sensitivity of the persons tested at the different BCG vaccination centers in the country was shown to follow the usual pattern of direct relation to age and degree of crowding.

An intradermal dose of 0.1 cc. of the vaccine<sup>2</sup> (0.1 mg. of BCG) was used. In general only persons giving a negative reaction to 0.005 mg. of PPD were eligible for vaccination. Persons giving a doubtful reaction were vaccinated, however, when the reaction to the second dose remained doubtful during a period of ten weeks or more. A special search for the Koch phenomenon was made whenever possible in the case of vaccination performed on children giving a doubtful reaction.

A total of 32,956 vaccinations were effected in the Republic from January 1, 1949, to October 31, 1951. Of these, 13,441 were newborn up to two months of age.

Sensitivity to tuberculin after vaccination was seen as early as ten days after vaccination. Revaccination was performed when the reaction to the tuberculin was negative and when no reaction, or only a small dry scar, was observed at the site of vaccination.

In table 1 are presented the results obtained in Panama City (population, 169,898) of tuberculin tests effected six to twenty-six weeks after vaccination of children who were vaccinated shortly after birth (up to two months) and of older children. Results of tuberculin tests after revaccination are not included.

In table 2 are shown the results of the retests in twelve to eighteen and nineteen to thirty months after vaccination in Panama City. Those who reported for retesting nineteen to thirty months after vaccination, but not before, are not included in the table.

Reference to table 2 shows that 66.84 per cent of the persons vaccinated in 1949 and

<sup>1</sup> PINZON, T. P. DE: Annual Reports of the Gorgas Memorial Laboratory, 1949 and 1950.

<sup>2</sup> The vaccine was generously donated by the Instituto del BCG del Consejo Nacional de Tuberculosis of Cuba.

TABLE 1  
RESULTS OF POSTVACCINAL TUBERCULIN TESTS IN PANAMA CITY SIX TO TWENTY-SIX WEEKS AFTER VACCINATION

YEAR	TOTAL TESTED	NEWBORNS*						OLDER CHILDREN						BOTH GROUPS					
		Positive		Negative		Doubtful		Positive		Negative		Doubtful		Positive		Negative		Doubtful	
		Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
1949	3,880	1,200	97.09	36	2.91	—	0.00	2,563	96.94	81	3.06	—	0.00	3,763	96.98	117	3.02	—	0.00
1950	5,127	2,624	99.21	21	0.79	—	0.00	2,444	98.47	36	1.45	2	0.08	5,068	98.85	57	1.11	2	0.04
1951	4,239	2,826	99.96	1	0.04	—	0.00	1,394	98.73	18	1.27	—	0.00	4,220	99.55	19	0.45	—	0.00
Totals	13,246	6,650	99.14	58	0.86	—	0.00	6,401	97.90	135	2.06	2	0.03	13,051	98.53	193	1.46	2	0.02

\* Up to two months of age.

65.87 per cent of the persons vaccinated in 1950 were still positive nineteen to thirty months after vaccination. Of the 199 persons (17.26 per cent) who were negative twelve to eighteen months after vaccination in 1949 and who had to be revaccinated in 1950, 74 showed up for tuberculin retesting twelve to eighteen months after revaccination, i.e., in 1951. Of these, 32 (43.24 per cent) were negative again. That is, the proportion of negatives among the revaccinated in 1950 was greater than among the vaccinated of the same year.

Untoward reactions to vaccination have been relatively few (31 among 21,139 children vaccinated in Panama City), the most common reported to the BCG Vaccination Service being subaxillary and cervical lymphatic enlargements. In one of these cases, spontaneous opening and draining of a subaxillary lymph node occurred; and, in another, surgical intervention was deemed necessary by the physician who reported the case. The cases reported to the Service in Panama City, either by physicians or by the relatives of the child, included 25 cases of subaxillary adenitis, 4 cases of cervical adenitis, and 2 of abscess at place of vaccination.

It is of interest to note that, of 31 reported cases of untoward reactions, 5 occurred among twins; 4 occurred in two pairs of identical female twins vaccinated before they were

TABLE 2

POSTVACCINAL TUBERCULIN TESTS TWELVE TO EIGHTEEN AND NINETEEN TO THIRTY MONTHS AFTER VACCINATION

YEAR VACCINATED	12 TO 18 MONTHS AFTER VACCINATION						19 TO 30 MONTHS AFTER VACCINATION							
	Total Tested	Positive		Negative		Doubtful		Total Tested	Positive		Negative		Doubtful	
		Number	Per cent	Number	Per cent	Number	Per cent		Number	Per cent	Number	Per cent	Number	Per cent
1949	1,153	942	81.70	199	17.26	12	1.04	484	396	81.81	86	17.77	2	0.41
1950	1,262	1,026	81.29	228	18.07	8	0.63	58	47	81.03	11	18.97	—	0.00
Total	2,415	1,968	81.49	427	17.68	20	0.83	542	443	81.73	97	17.90	2	0.37

three months old; and one occurred in a baby vaccinated at nine months of age whose twin died at birth.

Reactions appeared as early as two weeks and as late as seven months after vaccination.

Among the cases of cervical adenitis is that of a child vaccinated twenty-four hours after birth and revaccinated four months later because of failure to react to tuberculin. Three months later a very small dry scar was visible at the site of vaccination and sensitivity to tuberculin was slight. Seven months later, i.e., ten months after the second vaccination, enlargement of the lymph nodes at the base of the neck on the left side occurred.

Not included in the 31 cases are 2 of reactivation of the ulcer produced by the vaccine one year after it had apparently healed. Both subjects were babies vaccinated before they were one month old. The mother of one of the babies was tuberculous and under medical care. The ulcer reopened following injection of 0.005 mg. of tuberculin (reaction to 0.00002 mg. had been negative) and drained for a few days, after which it healed completely. In the case of the other baby, reactivation of the ulcer occurred without previous tuberculin injection.

Although the Koch phenomenon might have occurred in children vaccinated following a negative reaction to the second dose of tuberculin, the writer never had the opportunity



to observe one since the children returned to the office only six weeks after vaccination. However, the phenomenon was observed among those vaccinated after a doubtful reaction to the second dose who were given an appointment three or four days later in order to check for Koch phenomenon. On one occasion a ten-year-old girl was vaccinated following a negative reaction to 0.0025 mg. of tuberculin. The girl complained of general malaise and headache twenty-four to forty-eight hours after vaccination, and a local reaction was observed at the site of vaccination five days later.

The conversion from a doubtful tuberculin reaction to a definitely positive one was observed following the injection of either a higher dose of tuberculin or of the BCG vaccine.

During the years 1949 to 1951, inclusive, a total of 106 deaths caused by tuberculosis among children up to fifteen years of age who lived in Panama City and suburban towns was reported to the city health office. Twenty-six had been attended at the BCG center: 3 in 1949, 11 in 1950, and 12 in 1951. Of these, 4 had been vaccinated; 2 of them twenty-four hours after birth and 2 upon giving a negative reaction to 0.005 mg. of PPD.

Of the 4 reported deaths among 21,139 children vaccinated in Panama City, a study shows that 2 were patients in whom the possibility of vaccination during the pre-allergic state of a tuberculous infection could not be excluded; one was a patient in whom a heavy exposure to tuberculosis concurred with the vaccination; and one patient, also heavily exposed to tuberculosis, died two years after vaccination, with postvaccinal allergy never determined.

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June 6, 1952