

# REVIEW OF THE RESULTS OF THE POLIOMYELITIS VACCINATION CAMPAIGN

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The report that follows reviews briefly the results of the 1961 nation-wide campaign against poliomyelitis during the year (October 1961 - September 1962) following the end of that campaign. During this year a careful check was kept by the State Health Department of all cases notified as poliomyelitis. Virus studies have been carried out in the laboratories of the Poliomyelitis Research Foundation on all patients with the diagnosis of poliomyelitis, aseptic meningitis, or a number of other suspect virus conditions, admitted to the Fever and Isolation hospitals in Pretoria,

Johannesburg, Bloemfontein, Durban, East London, Port Elizabeth and Cape Town. The findings in these patients are reviewed.

## CASES NOTIFIED AS POLIOMYELITIS

During this period 70 cases were notified to the State Health Department as suspect poliomyelitis. In Table I the notifications for the preceding 5 years are given. It is apparent that there was a notable reduction in the year under review. The clinical records of these patients are

TABLE I. NOTIFICATIONS OF CASES OF POLIOMYELITIS

Year	Total cases
1957	2,442
1958	675
1959	726
1960	1,054
1961 (January-September)	360
October 1961-September 1962	70

not all complete and, in many of them, the diagnosis cannot be accurately assessed. However, it appears probable that many did not have poliomyelitis. In only 12 of them is it categorically stated that the patient had paralysis or weakness of the muscles. Of the 70 patients notified, 5 were stated to have received 3 doses of oral vaccine, 7 to have received 2, and 6 to have received 1 dose of vaccine at some time before their illness. Of the 12 paralytic cases 8 received vaccine. In none of them was the dose of vaccine given within 30 days of the onset of illness and, therefore, a causal relationship between the vaccine and the illness was not suspected. The remainder had not received vaccine (Table II).

## VIRUS STUDIES

## Notified Cases

Specimens for virus studies were received from 38 of the 70 patients notified. Each specimen was tested for the presence of virus by inoculation of prepared suspensions

into 2 tissue cultures of monkey kidney cells and by inoculation into a litter of baby mice. No virus was isolated from the specimens received from 22 patients. On clinical grounds 2 of these patients from whom no virus was isolated were considered to have the Guillain-Barré syndrome.

Virus was isolated from 16 patients (Table III). Three

TABLE III. NOTIFICATIONS OF CASES OF POLIOMYELITIS

Total	70
Stated to have paralysis	12
Virus studies cases	38
Virus isolated	16
Poliovirus type 1	9
Poliovirus type 2	2
Poliovirus type 3	1
Coxsackie A	1
Coxsackie B	2
Unidentified	1

of these proved to be Coxsackie viruses, and 1 was not identified. Of the 12 patients from whom poliovirus was isolated, 9 had type 1, 2 type 2 and 1 type 3. Of the 12 patients, 6 were stated to have paralysis, and in the other 6 from whom isolations were made, the diagnosis was not stated. The information about these 12 cases is summarized in Table IV.

## Patients Admitted to Hospitals

During the same period the hospitals at the strategic centres of Cape Town, Port Elizabeth, East London,

TABLE II. PATIENTS STATED TO HAVE PARALYSIS

Initials	Race	Age	Sex	Locality	Oral vaccine doses	Type of paralysis	Poliovirus isolated
1 E.A.	E	22 years	M	Port Elizabeth	2	Complete paralysis. Guillain-Barré syndrome	
2 E.W.	B	2 years 8 months	F	Port Elizabeth	1	Paralysis of both legs. Unable to sit or stand	Type 2
3 B.D.	B	1 year	F	Pinetown	?	Weakness of both lower limbs	Type 1
4 E.J.	C	8 months	M	Port Elizabeth	1	Muscles affected, back, neck, left shoulder girdle	
5 A.M.	B	8 years	M	Carolina		Paralysis of left arm	
6 C.C.	C	11 months	M	Vasco	2	Flaccid paralysis of both legs	Type 1
7 L.V.R.	C	16 months	M	Cape Town	1	Paralysis of right leg	Type 1
8 J.H.	B	5 years	F	Humansdorp	2	Weakness of left shoulder girdle	
9 K.G.	C	9 years	M	Cape Town		Bilateral progressive weakness of both legs. Guillain-Barré syndrome	
10 A.P.	C	1 year	M	Cape Town	1 2 Salk	Paralysis of right leg	Type 1
11 T.R.	B	11 months	F	Bloemfontein		Paralysis of left arm and both legs	Type 1
12 M.P.	B	1 year 6 months	F	Port Elizabeth		Paralysed right arm—flaccid paralysis	Type 1

E=European, B=Bantu, C=Coloured, M=male, F=female.

TABLE IV. SUMMARY OF 12 PATIENTS FROM WHOM POLIOVIRUS WAS ISOLATED

Initials	Race	Age	Sex	Locality	Polio vaccine doses	Paralysis	Type of poliovirus
1 N.M.	B	8 months	F	Melmoth	Not stated		Type 1
2 G.D.K.	E	5 years	M	Pinetown	3 oral		Type 2
3 E.W.	B	2 years 8 months	F	Port Elizabeth	1 oral	Paralysis of both legs. Unable to sit or stand	Type 2
4 B.D.	B	1 year	F	Pinetown	Not stated	Weakness of both lower limbs	Type 1
5 C.C.	C	11 months	M	Vasco	2 oral	Flaccid paralysis of both legs	Type 1
6 L.V.R.	C	1 year 4 months	M	Cape Town	1 oral	Paralysis of right leg	Type 1
7 W.W.	C	2 years	M	Strand	Not stated		Type 1
8 A.P.	C	1 year	M	Cape Town	2 Salk 1 oral	Paralysis of right leg	Type 1
9 J.N.	B	2½ years	F	Johannesburg	Not stated		Type 1
10 W.N.	B	10 months	M	Port Elizabeth	Not stated		Type 1
11 N.N.	B	10 months	F	East London	Not stated		Type 3
T.R.	B	11 months	F	Bloemfontein	No vaccine.	Paralysis left arm and both legs	Type 1

B=Bantu, E=European, C=Coloured, F=female, M=male.

TABLE V. ISOLATION OF POLIOVIRUS FROM PATIENTS IN VARIOUS CENTRES

Centre	Total cases	Poliovirus isolated			Vaccine given (where stated)			No. of patients stated to have paralysis
		T1	T2	T3	3 doses	2 doses	1 dose	
Johannesburg .. ..	15	6	9	—				0
Cape Town .. ..	4	4	—	—	1	2		2
Port Elizabeth .. ..	6	6	—	—				0
East London .. ..	1	—	—	1				0
Pretoria .. ..	2	2	—	—				1
Bloemfontein .. ..	1	1	—	—				1
Durban .. ..	5	4	1	—				2
Totals .. ..	34	23	10	1	1	2		6

Durban, Bloemfontein, Johannesburg, Pretoria, Bulawayo, Salisbury and Nairobi continued to send specimens for virus studies from all patients diagnosed clinically as having poliomyelitis or aseptic meningitis, and also from those with various other conditions in which a virus cause was suspected. The results of the tests on the specimens received from patients in the South African centres are given in Table V. It will be noted that poliovirus was isolated from 34 patients. Of these, 23 were type 1, 10 type 2 and 1 type 3. Of the 34 patients from whom poliovirus was isolated, 15 were diagnosed as having poliomyelitis and 3 meningo-encephalitis; in 7 a variety of conditions was suspected, including fever of unknown origin, glandular fever, gastritis, myocarditis, tonsillitis, whooping cough and arthritis; and in 9 the diagnosis was not stated.

Most of this miscellaneous group of patients presumably had a vaccine virus infection which was not related to the cause of the illness. Of the 15 patients suspected of having poliomyelitis, 7 were stated to have paralysis or weakness, and all of these were notified to the State Health Department as having poliomyelitis. None of the other patients in whom, presumably, non-paralytic poliomyelitis or some other condition was suspected, was notified as having poliomyelitis.

Of the 7 diagnosed as having paralytic poliomyelitis, only 1 had had 3 doses of vaccine, 2 had had 2 doses and 1 had had 1 dose. In none of these was the onset of illness within 30 days of the vaccine being given and, therefore, the suspicion that the vaccine virus was concerned does not arise. In view of the suspicion that several cases in North America were caused by type 3 poliovirus vaccine, it is relevant to note that only 1 type 3 virus was isolated in South Africa during this year.

#### IMMUNITY SURVEYS

The immunity status of the young adult European population in South Africa should reflect the effect of the mass vaccination campaign. In this respect, it is of interest to compare the findings, over a period of 5 years, of the antibody tests done on the nurses recruited for Grey's Hospital, Pietermaritzburg, Natal. Tests on the nurses during their service in this hospital have been systematically carried out since 1956, and the results of these tests are given in Table VI.

These results clearly reflect the much greater degree of immunity shown in the year 1962, compared with the preceding years. It is notable that in this year 91% of

TABLE VI. TESTS ON SERA FROM NURSES OF GREY'S HOSPITAL, PIETERMARITZBURG

Year	Total	Negative			Triple immune	
		T1	T2	T3	No.	%
1956 ..	131	33	37	37	58	44.3
1957 ..	392	82	100	139	150	38.3
1958 ..	178	16	22	40	107	62.9
1959 ..	104	10	11	20	60	57.7
1960 ..	153	16	14	24	107	63.4
1961 ..	183	6	14	29	141	77.5
1962 ..	110	2	—	7	92	91.0

those tested were 'triple immunes', and of the 9 of the 110 tested who lacked antibodies, 2 lacked type 1 antibody and 7 type 3 antibody. This, to some extent, reflects the better immunizing potential of type 2 virus as compared with the other 2 strains. It also reflects that in this respect type 3 virus is the least satisfactory of the 3 vaccine strains. The failure of this strain of type 3 virus to take in competition with the other 2 viruses, however, is more clearly reflected in the special studies reported in the preceding papers.

#### DISCUSSION

From these results it is apparent that the oral vaccine campaign undertaken in South Africa has achieved a notable reduction in the incidence of cases of paralytic poliomyelitis and that the proportion of children and of adults fully immune to this disease has notably increased. The occurrence of paralytic cases which have been reported from each of the Provinces during the year indicates that the infection continues to smoulder and remains widespread. The immunity studies carried out have also revealed that a proportion of the population lacks antibodies against one or more types of poliovirus. This non-immune population would include a few individuals who, in spite of having taken the vaccine, had not been infected in turn with each type of poliovirus, but most would be individuals who did not take the full course of the vaccine or who arrived from other countries after the vaccination campaign was completed, and who had not received the vaccine in the countries from which they came. The susceptible population, of course, is being increased daily by new births and also by new arrivals from overseas. The non-immune population is liable to infection, and a proportion will develop paralytic poliomyelitis as a result of this infection. It is essential, therefore, that all those needing the vaccine should receive it to keep the disease under control. It is incumbent upon medical practitioners

to ensure that all their patients are given vaccine, particularly babies born since the campaign. All those in the older age group who have not yet taken the vaccine should be advised to do so.

**With regard to the future, it is clear that, having once undertaken a mass vaccination campaign, vaccination of susceptible persons among all population groups will have to be continued indefinitely. If this is not done, a proportion of the population will grow up without being naturally infected, and when a virulent strain of wild virus is introduced, as would inevitably happen sooner or later, a serious epidemic of poliomyelitis would result.**

In this respect it is of interest to note that during the year under review, poliomyelitis occurred in epidemic form in Rhodesia and Kenya. Virus studies were carried out at the Poliomyelitis Research Foundation on cases occurring during these epidemics and it was noted that

in Rhodesia most cases were due to type 1, while in Kenya, and in Mombasa in particular, most were due to type 2. There is, of course, regular traffic between all the territories in Southern Africa (and indeed most of the countries of the world) and South Africa, and this will ensure the continued introduction of virulent strains of wild virus.

The occurrence of poliomyelitis in epidemic form in which most cases were caused by types other than type 1 virus emphasizes the importance of ensuring that the vaccine is trivalent. To meet the present situation, the State Health Department has arranged for vaccine to be freely available to all those who need it. To ensure full protection, trivalent vaccine should be given on at least 3 occasions spaced about 2 months apart. As long as the population is adequately vaccinated, poliomyelitis need not be feared.