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STUDIES ON FURTHER ATTENUATED LIVE MEASLES VACCINE

V. IMMUNIZATION TEST OF CAM-A4 MEASLES VACCINE ON HANDICAPPED CHILDREN

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SUMMARY Tests on immunization against measles with CAM-A4 measles vaccine were made on handicapped children. A hemagglutination inhibition antibody response was observed in 26 of 27 initially seronegative children (96.3% seroconversion rate). Eighteen of the 26 children who showed an antibody response had a fever of over 37.5 C but only 4 of them had a fever of over 39.0 C in the period from 5 to 12 days after vaccination (69.2% incidence of a febrile reaction). The incidence of a febrile reaction and development of other clinical reactions following the vaccination were similar in handicapped children and in normal children.

INTRODUCTION

The associated paper reported the clinical reactions and antibody response observed following vaccination of healthy children with CAM-A4 measles vaccine (Ueda et al., 1960c). The clinical reactions were less than those observed previously using attenuated virus vaccine with gammaglobulin.

Mentally or physically handicapped children have a tendency to become very ill when infected with measles virus. So, their effective immunization against measles is more important than that of normal children.

This study was made to decide whether the further attenuated live measles virus vaccine (CAM-A4 measles vaccine) could be used on handicapped children.

MATERIALS AND METHODS

1. *Vaccinees and vaccination*

Thirty eight handicapped children of 4 to 17 years old admitted to Shin-Mukogawa Hospital in Nishinomiya City, Hyogo were injected subcutaneously with 0.5 ml of CAM-A4 measles vaccine in December, 1969 and January, 1970.

Their diagnoses are shown in Table 1. More than half of them had cerebral palsy, and most of the children with diseases which could not be diagnosed suffered from attacks of convulsions.

Twenty seven of the 38 children had no detectable

TABLE 1. *Diagnoses of handicapped children receiving CAM-A4 measles vaccine*

Diagnoses	No.	%
Cerebral palsy	26	68.4
Cerebral palsy+ mental deficiency	1	2.6
Microcephaly	2	5.3
Child schizophrenia	1	2.6
Epilepsy	1	2.6
Uncertain	7	18.4
Total	38	100

hemagglutination-inhibiting (HI) antibody and 11 of the 38 children had an HI antibody titer of over 2^3 before vaccination.

2. *Vaccine*

CAM-A4 measles vaccine was used in the immunization test. Its virus titer was $10^{3.8}$ $TCID_{50}$/0.1 ml.

3. *Clinical observation and serological examination*

The children were examined by doctors and nurses every day and their axillary temperature was recorded 4 times a day (0800, 1300, 1800 and 2200 hrs) for 3 weeks after vaccination.

Blood specimens were taken on the day of vaccination and one month later. Antibody titers were measured by the HI test. Other materials and methods were as described previously (Takaku et al., 1970; Ueda et al., 1970a, b, c).

RESULTS

1. *HI antibody response*

As shown in Fig. 1, 26 of the 27 susceptible children showed an HI antibody response one month after vaccination and the seroconversion rate was 96.3%. The geometric mean HI antibody titer was $2^{4.5}$.

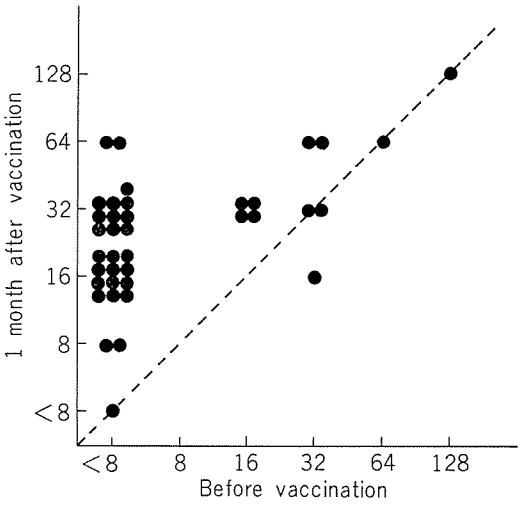

FIGURE 1. *HI antibody response of handicapped children to CAM-A4 measles vaccine.*

2. *Clinical reactions*

1) Febrile reaction

As shown in Table 2, 69.2% of the children developed a fever of over 37.5 C in the critical period 5 to 12 days after vaccination, but only

TABLE 2. *Maximal temperatures of handicapped children in the period 5 to 12 days after vaccination with CAM-A4 measles vaccine*

		Maximal temperature (C)					Total
		≤37.4	37.5–37.9	38.0–38.9	39.0–39.9	≥40.0	
Susceptible	No.	8	5	9	4	0	26
	%	30.8	19.2	34.6	15.4	0	
	Cumul. %[a]	100	69.2	50.0	15.4	0	
Immune	No.	5	0	2	3	1	11
	%	45.5	0	18.2	27.2	9.1	

a Cumulative percent

15.4% of them had a fever of over 39.0 C. Of the children who were immune before vaccination 54.5% developed a fever of over 37.5 C while 36.3% had a fever of over 39.0 C in the same period.

The febrile reaction developed after 7 and 11 days (mean 8.8 days) as shown in Table 3 and a fever of over 37.5 C lasted for less than 3 days in all but one child as shown in Table 4.

2) Other clinical reactions

Not all children developed a rash and no child had convulsions. Malaise, anorexia and catarrh symptoms were observed in some children but these were in general mild, and children recovered soon after their temperatures dropped. Seventeen of the 26 children who showed an HI antibody response (65.4%) had none of these symptoms (Table 5).

TABLE 5. *Clinical reactions other than fever in 26 susceptible children*

	None	Malaise	Anorexia	Catarrh	Rash	Convulsions
No.	17	2	5	5	0	0
%	65.4	7.8	19.4	19.4	0	0

TABLE 3. *Incubation period of development of a febrile reaction*

	Days after vaccination	5	6	7	8	9	10	11	12	Total
Susceptible	No.	0	0	1	5	9	2	1	0	18
	%	0	0	5.6	27.8	50.0	11.1	5.6	0	100
Immune	No.	0	1	1	1	1	0	0	2	6
	%	0	16.7	16.7	16.7	16.7	0	0	33.3	100

TABLE 4. *Duration of a fever of over 37.5C*

	Days	0.5	1.0	1.5	2.0	2.5	≥3.0	Total
Susceptible	No.	9	2	3	1	2	1	18
	%	50.0	11.1	16.7	5.6	11.1	5.6	100
Immune	No.	0	3	0	1	0	2	6
	%	0	50.0	0	16.7	0	33.3	100

DISCUSSION

CAM-A4 measles vaccine is a newly developed, further attenuated, live virus vaccine. Small scale clinical tests showed that handicapped children responded clinically and serologically to this vaccine in the same way as healthy children. The incidence of a febrile reaction was slightly higher than in healthy children, but half the immune children had a fever in the same period. Thus, it is uncertain whether the higher incidence of febrile reactions observed after vaccination was due to the vaccine. The duration of the fever and clinical reactions other than the febrile reaction were similar to those in healthy children. The seroconversion rate and HI antibody titers were also similar to those of healthy children.

Thus, CAM-A4 measles vaccine seems safe and effective for use on handicapped children.

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