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STUDIES ON MEASLES IN THAILAND

V. PROTECTION AGAINST A MEASLES OUTBREAK BY PREVIOUS VACCINATION IN AN ISOLATED INSTITUTION

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SUMMARY Five cases of measles occurred in September, 1970 in an isolated institution. This institution contained the following groups of children: 32 children who had been vaccinated with killed and live measles-virus vaccines (KL) in October, 1967, 32 children who had received further attenuated live measles-virus vaccine (FAL) in February, 1970, 22 children with a past history of measles and 71 unvaccinated children including infants of under 8 months of age. Among the cases of measles, one was an unvaccinated child, 3 were children showing no take with live measles vaccine and the last was an exceptional case, showing take with live vaccine on vaccination with KL. No further cases occurred, suggesting that the secondary spread of measles virus was prevented by previous immunization with KL or FAL.

Serological investigation showed that (1) more than half of 26 children showing take with live vaccine in the group vaccinated with KL showed booster antibody responses without any symptoms of measles, and the other half of the children retained the same antibody titers as those the year before, (2) only one of 32 children in the group vaccinated with FAL showed a booster antibody response.

INTRODUCTION

Since licensure of two types of measles vaccines in Japan in 1966 (live attenuated measles-virus

vaccine (Toyoshima strain (Okuno et al., 1960) and Sugiyama strain (Matsumoto et al., 1962)

and inactivated vaccine) many physicians have routinely used a combination of killed and live measles vaccines (KL). Consequently, decline in the incidences of lethal and non lethal cases of measles has been noted. However, the occurrence of atypical measles in recipients of killed vaccine (Fulginiti et al., 1967) has caused concern about the long-term efficacy of KL.

Our follow-up studies on KL recipients showed that immunity after KL was lasting (Ueda et al., 1969, 1970; Sangkawibha et al., 1971b). A survey sponsored by the Japan Measles Vaccine Research Commission in 1969 revealed a few cases of atypical measles among recipients of KL (Japan Measles Vaccine Research Commission, 1970).

This report presents evidence for the protective efficacy of KL in an isolated institution containing two groups of children who had received KL and further attenuated live measles-virus vaccine (FAL) in 1967 and 1970, respectively.

MATERIALS AND METHODS

1. Children

The following groups of children in the Central Preventorium for Children in Nondhaburi, Thailand

were investigated: A, 32 children who had received KL between October and November, 1967 (Tuchinda et al., 1968), B, 32 children who had received FAL (CAM and Moraten strains) in February, 1970 (Sangkawibha et al., 1971a), C, 22 children with a past history of measles and D, 71 unvaccinated children including infants of under 8 months of age in September, 1970.

2. Blood specimens and neutralizing antibody titration

Thirty-one blood specimens were collected from children in group A (3 years after KL) and 32 children in group B (1 year after FAL) in January, 1971. Neutralizing antibodies were measured by the micro-method (Ueda, 1971).

RESULTS

1. Measles cases

One child contracted measles in September, 1970. Subsequently, there were 4 more cases within about 2 weeks. The first case was one of the 5 children in group A who had shown no response to live vaccine (L) in 1967 (no L-take). Two other cases occurred among the no L-take children. Another case was one of 71 unvaccinated children. The fifth case was one of the 27 L-take children in group A

TABLE 1. Summary of records of 4 cases of measles in children receiving KL in October, 1967 and a case in unvaccinated children

Code No.	Age at onset	Sex	Take of L	Date of onset	Fever		Rash	Others
					Max. T. (C)	Duration		
29	4y3m	female	yes	29 Sept. 1970	40	1 week	+	coughing vomiting anorexia
32	4y3m	female	no	29 Sept. 1970	over 37	2 days	+	nasal secretion coughing
46	4y3m	female	no	24 Sept. 1970	over 39	5 days	+	nasal secretion conjunctivitis coughing anorexia
56	4y3m	female	no	16 Sept. 1970	38	5 days	+	coughing anorexia
70	5y	male	unvaccinated	29 Sept. 1970	over 38	6 days	+	conjunctivitis coughing nausea vomiting

who had responded to L in 1967. Her neutralizing antibody titer was $2^{2.5}$ in both December, 1968 and February, 1970. The clinical records of these children are summarized in Table 1. There was no evidence that the 4 cases in group A had atypical measles.

None of the children in group B contracted measles, and no further cases have occurred

since.

2. Serological analysis

As shown in Table 2, two of the no L-take children who contracted measles showed increased neutralizing antibody titers. Child No. 54 did not show any symptoms of measles but her neutralizing antibody titer increased markedly. Child No. 3 showed neither symp-

TABLE 2. *Neutralizing antibody titers^a in children vaccinated with KL*

		Code No.	Time after vacation			
			1 month ^b	1 year ^c	2 years ^d	3 years ^e
Susceptible	L-take	1	9.5	4.5	3.5	3.0
		2	8.0	4.5	3.5	3.0
		4	9.0	3.5	3.5	10.5
		5	>10.5	6.0	5.0	4.5
		7	8.5	4.5	4.5	
		9	9.0	5.0	4.0	9.0
		11	10.0		5.0	8.5
		12	10.0	5.5	2.5	7.0
		13	8.0	3.5	3.5	4.0
		29 ^f	8.0	2.5	2.5	8.0
		30	>10.5	6.5	6.5	8.5
		31	8.5	3.0	2.5	8.0
		33	9.5	5.5	4.5	10.5
		35	6.5	3.0	2.5	3.5
		36	9.0		7.0	7.0
		37	6.5	2.5	1.5	10.5
		38	9.5	4.0	3.5	9.0
		39	8.5	4.5	4.0	
		40	8.5	4.0	3.5	4.5
		41	8.5	3.0		
		42	7.0	3.0	3.5	8.5
		43	7.5	3.5	4.0	4.0
		44	7.5	4.5		
		45	6.0	3.0	3.0	8.0
		47	6.5	3.0	3.0	4.5
		50	>10.5	7.0	5.5	6.0
		52	9.5	4.0	3.5	4.5
		53	6.5		6.5	7.5
		58	8.5	3.0	4.0	6.5
		59	9.5	4.5	4.5	9.5
		71		5.5	3.0	5.0
	no L-take	3	<4.5	<0	<0	<0.5
		32 ^f	<4.5	<0	<0	8.5
		46 ^f	<4.5	<0	<0	8.5
		54	<4.5	<0	<0	9.5
		56 ^f	<4.5	<0		
Immune		51		7.0	7.5	9.0
		69		>8.5	>8.5	
		73		6.0	6.0	6.5
		104			>8.5	10.0

a log₂ *b* Dec., 1967 *c* Dec., 1968 *d* Feb., 1970 *e* Jan., 1971 *f* contracted measles in Sept., 1970

toms of measles nor an increased antibody titer.

Child No. 29 had had a neutralizing antibody titer of $2^{2.5}$ in February, 1970, but she contracted measles in September, 1970 and her antibody titer increased to $2^{8.0}$ in January, 1971.

The antibody titers of the immune children surveyed who had had measles before vaccination did not show any change.

Comparison of the neutralizing antibody titers in L-take children in group A between 2 and 3 years after vaccination showed that 15 of 27 L-take children showed booster antibody responses (Table 2). Most of these children had neutralizing antibody titers of under $2^{5.0}$ before cases of measles occurred. Children who showed no booster antibody response had the same antibody titers as 2 years previously; no further decline in the antibody titers was observed.

Fig. 1 shows a comparison of the neutralizing antibody titers in children of group B one month and one year after vaccination with FAL. Only one of 32 children who received "Moraten" live measles-virus vaccine showed a booster antibody response, though she showed no clinical evidence of measles. One-third

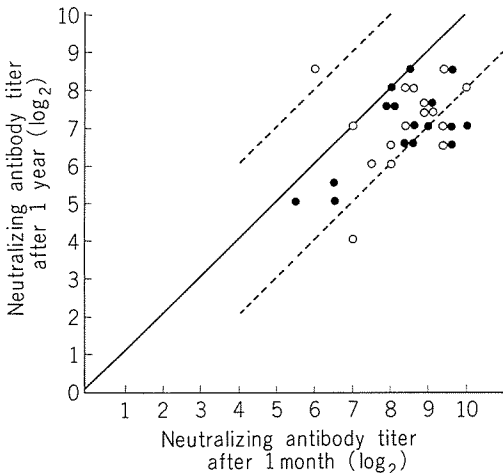


FIGURE 1. Comparison of measles neutralizing antibody titers in children between one month and one year after vaccination with FAL. Symbols: ●, CAM; ○, Moraten.

of the children showed 4-fold or more decline in antibody titers one year after vaccination, though there was no difference in the persistence of antibody in children who had received CAM strain and Moraten strain, respectively.

DISCUSSION

There was a measles outbreak in the Central Preventorium for Children, Nondhaburi, Thailand at the beginning of 1967. Sixty eight cases with clinical symptoms of measles had occurred in children of over 11 months of age, and almost all susceptible children had contracted measles at that time (Tuchinda et al., 1968). Since vaccination of the children with KL in October, 1967 and with FAL in February, 1970, there had been no cases of measles in this isolated institution for 2 and a half years. However, in September, 1970, one child contracted measles. Within 2 weeks, 4 more cases of measles occurred among the 157 children. This difference in the number of cases before and after vaccination must be due to the effect of vaccination first with KL and then with FAL, which presumably prevented the spread of measles.

It is understandable that 3 of the 5 no L-take children developed symptoms of measles because they had no detectable neutralizing antibody. However, there were 2 exceptional cases; one (No. 29) was a L-take child with symptoms of measles and the other (No. 54) was a no L-take child without symptoms of measles. The former child had a neutralizing antibody titer of $2^{2.5}$ both in December, 1968 and February, 1970. Five children had antibody titers of $2^{2.5}$ or less in February, 1970, but only this one contracted measles (Table 2). Three of the other 4 children showed booster antibody responses, and the other child showed neither symptoms of measles nor a booster antibody response. It is unknown why child No. 29 showed symptoms of measles while child No. 54 did not.

Fourteen of 26 L-take children in group A

showed booster antibody responses without clinical symptoms of measles whereas only one of the 32 children in group B showed a booster antibody response. This difference may be due to the difference in the neutralizing antibody titers: group A (measured in February, 1970) had low titers while group B (measured in March, 1970) had high titers.

Children in group A, who escaped infection with measles virus retained as high measles neutralizing antibody titers as those measured one year previously. This confirms the prediction (Sangkawibha et al., 1971b) that neutralizing antibodies induced by vaccination with KL will persist. In the children in group B, who were immunized with FAL the neutralizing antibody titers had not decreased ap-

preciably one year after vaccination, though high titers observed one month after vaccination tended to decrease more than lower ones, as reported previously (Ueda et al, 1971).

Thus, vaccination with either KL or FAL seems to provide effective persistent immunity against measles, and may control the spread of natural measles virus and the occurrence of cases of measles.

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REFERENCES

- Fulginiti, V. A., J. J. Eller, A. W. Downie and C. H. Kempe. 1967. Altered reactivity to measles virus. Atypical measles in children previously immunized with inactivated measles vaccine. J. Amer. Med. Ass. 202: 1075-1080.
- Japan Measles Vaccine Research Commission. 1970. Survey of children previously vaccinated by the killed-live measles vaccine regimen. Report on the evaluation of further attenuated live measles virus vaccine in Japan (in Japanese).
- Matsumoto, M., M. Mutai, Y. Saburi, R. Fujii, M. Minamitani and K. Nakamura. 1962. Live measles-virus vaccine: clinical trial of vaccine prepared from a variant of the Sugiyama strain adapted to bovine kidney cells. Jap. J. Exp. Med. 32: 433-448.
- Okuno, Y., T. Sugai, K. Toyoshima, M. Takahashi, T. Yamamura, S. Hata, T. Miki, K. Nakamura, S. Ueda and N. Kunita. 1960. Studies on the prophylaxis of measles with attenuated living virus. VI. Inoculation tests in children with chick embryo passage measles virus in 1960. Biken's J. 3: 293-300.
- Sangkawibha, N., P. Tuchinda, S. Bukkavesa, P. Osatanonda, S. Ueda and Y. Okuno. 1971a. Comparative study on two further attenuated live measles virus vaccines, "CAM" and "Moraten". Biken J. 14: 77-79.
- Sangkawibha, N., P. Tuchinda, S. Bukkavesa, P. Osatanonda, S. Ueda and Y. Okuno. 1971b. Studies on measles in Thailand VI. Persistence of measles antibody in the absence of natural virus two years after vaccination by the "KL" method. Biken J. 14: 149-154.
- Tuchinda, P., N. Sangkawibha, S. Ueda, Y. Okuno, S. Bukkavesa, S. Habanananda, P. Mansuwan, R. Ketusinga, P. Viranuvatti, P. Bhangnanda and P. Osatanonda. 1968. Studies on measles in Thailand III. Field trials on measles vaccine (continued). Biken J. 11: 251-259.
- Ueda, S., M. Takahashi, H. Hosai, K. Yamanishi and Y. Okuno. 1969. Studies on the combined use of killed and live measles vaccines. IV. Four years follow-up. Biken J. 12: 69-75.
- Ueda, S., M. Takahashi, T. Kurimura, T. Ogino, N. Suzuki, K. Yamanishi, K. Baba and Y. Okuno. 1970. Studies on the combined use of killed and live measles vaccines. V. Five year follow-up. Biken J. 13: 179-183.
- Ueda, S. 1971. Comparison of measles antibody titers measured by the micro- and macro-methods. Biken J. 14: 155-160.
- Ueda, S., M. Takahashi, T. Kurimura, N. Suzuki, K. Yamanishi, K. Baba, Y. Okuno and Y. Sakamoto. 1971. Studies on further attenuated live measles vaccine. VI. Clinical and serological follow-up one year after vaccination. Biken J. 14: 247-251.