

## A Longitudinal Serologic Study of A, Bangkok School Population

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### OBJECTIVES :

1. To describe the prevalence of serologic evidence of previous togoviral and hepatitis B viral infections in a susceptible school population.
2. To determine the incidence of clinical and subclinical infections with the above agents during the "disease season" and during the period of the year without a large amount of clinical illness.
3. To investigate socioeconomic parameters possibly related to infection occurrence.

### BACKGROUND

Togoviral Infections : Pre- and post-dengue transmission season blood samples, taken June 1977 and January 1978, indicated that approximately 16% of the children at Phibunprachasan School experienced an infection with either an alphaviral or flaviviral togoviral agent during the 1977 "dengue season". Of 824 students who were seronegative for any flaviviral agent, 107(13.0%) sustained a primary type titer rise. Of the 1055 students with at least a 1:20 titer to one or more of the flaviviruses prior to the "dengue season", 176(16.7%) sustained at least one fourfold or greater titer rise between the June 1977 and January 1978 blood specimens. The corresponding values for alphaviral agents were 24 primary responses out of 1540 susceptibles (1.6%) and 10 infections out of the 349 students with pre-existing antibody (2.9%).

A minority of cases, clinically diagnosed as having hemorrhagic fever during the course of the school year, actually seroconverted between the seasonal blood samples (6/16).

During the "dengue season" of 1977 (approximately June to December), Bangkok sustained the highest number of hospitalized dengue hemorrhagic fever (DHF) cases recorded in Thailand (500-700/month) in seven years. In the following non-epidemic period, the number of cases fell to the usual non-epidemic level of less than 100 cases/month. During the subsequent "dengue season" beginning June 1978, the monthly total of hospitalized Bangkok patients never exceeded 200/month, and there were relatively few cases overall during that "dengue season".

## METHODS :

**Study Design :** Subsequent blood samples were collected from this population in June 1978 and January and June 1979. The June samples were taken from all children remaining at Phibunprachasan School from the original 1988 children enrolled in the study in June 1977. The January sample was only drawn on those children who were seronegative in the first three blood samples.

All blood samples obtained were tested for dengue, types I-IV, Japanese encephalitis virus and alphavirus antibodies by hemagglutination-inhibition (HI). Chikungunya virus antigen was used to test for anti-alphaviral antibodies. A sample of the positive and negative sera was chosen and tested by a microtiter neutralization test for dengue, types I-IV and Japanese encephalitis virus.

**Definitions :** Primary dengue infection : The acquisition of one or more type specific dengue HI antibodies in a person previously exhibiting no such antibodies (a titer of 1:20 is considered evidence of such antibody).

Secondary Dengue Infection : Evidence of a four-fold or greater titer increase in one or more type specific HI antibodies in a person exhibiting a 1:20 titer to one or more dengue antigens.

**RESULTS :** Table 1 presents the incidence of primary dengue infections between blood samples. Between January and June 1978, 14 out of 496 susceptible children (2.8%) sustained a primary dengue infection. Three children, including one of the above 14 children, became infected with an alphavirus (0.7%). Of the 482 seronegative students, 427 were retested in January 1979. Thirty students (7.0%) seroconverted during this "dengue season". Nineteen (4.8%) seronegative students acquired one or more anti-dengue antibodies between January and June 1979 during the non-epidemic period following a low level "dengue season".

Table 2 presents the incidence of secondary dengue infections occurring during these intervals.

As can be seen in Table 1, there was a significant difference in the primary acquisition of dengue antibody between the "dengue season" (June 77-Jan. 78) and the following non-epidemic period (Jan-Jun 78). This difference was not evident in a comparison of secondary cases (Table 2). The secondary dengue infections in the non-epidemic period were more common in older children than those infections occurring during the epidemic period, but the overall rate of secondary infection was not different during the two periods.

During the June 78-Jan 79 period, there were relatively few primary seroconversions, accurately reflecting the relative lack of hospitalized DHF cases during that period. However, secondary seroconversions continued at a rate similar to the previous two periods in the few children tested. Primary and secondary cases continued to occur predominately in the older children.

When dengue virus is not common in the population, e.g. January 1978 to January 1979, transmission tends to occur mainly in the older children. When the virus is not as rare, e.g. June 1977 to January 1978, transmission is not as

localized. Since the mean age of admission of a child with DHF in Bangkok is less than six years, hospitalization records reflect those periods when transmission spreads to the younger age groups.

A manuscript of this (completed) project is in preparation.

Table 1. Incidence of Dengue Antibody Acquisition in Previously Uninfected School Children

Age	Jun 77 - Jan 78		Jan - Jun 78		Jun 78 - Jan 79		Jan - Jun 79	
	No. tested	No. (%) acquiring antibody	No. tested	No. (%) acquiring antibody	No. tested	No. (%) acquiring antibody	No. tested	No. (%) acquiring antibody
4	31	0(-)	24	1(4.2)	0	0(-)	0	0(-)
5	37	6(16.2)	22	0(-)	23	0(-)	16	0(-)
6	55	3(5.5)	31	1(3.2)	22	1(4.5)	15	0(-)
7	104	16(15.4)	70	1(1.4)	26	1(3.8)	22	0(-)
8	100	16(16.0)	65	2(3.1)	64	1(1.5)	53	5(9.4)
9	100	12(12.0)	71	1(1.4)	62	3(4.8)	53	5(9.4)
10	98	18(18.4)	73	0(-)	68	2(2.9)	62	4(6.5)
11	101	18(17.8)	60	3(5.0)	62	4(6.5)	47	2(4.3)
12	88	13(14.8)	41	1(2.4)	50	3(6.0)	26	1(3.8)
13	63	11(17.5)	15	3(20.0)	24	3(12.5)	19	0(-)
14	35	3(8.6)	17	0(-)	10	1(10.0)	8	0(-)
15	12	1(8.3)	7	1(14.3)	10	7(70.0)	4	1(25.0)
16	0	0(-)	0	0(-)	6	4(67.7)	2	1(50.0)
	824	107(13.0)	496	14(2.8)	427	30(7.0)	327	19(5.8)

Table 2. Incidence of Dengue Antibody Titer Elevation in Previously Infected School Children

Age	Jun 77 - Jan 78		Jan - Jun 78		Jun 78 - Jan 79	
	No. tested	No. (%) demonstrating one or more elevations	No. tested	No. (%) demonstrating one or more elevations	No. tested	No. (%) demonstrating one or more elevations
4	6	1(16.7)	4	0(-)	0	0(-)
5	25	3(12.0)	24	4(16.7)	0	0(-)
6	38	8(21.1)	29	4(13.8)	2	0(-)
7	81	13(16.0)	63	4(6.3)	8	1(12.5)
8	99	23(23.2)	93	6(6.5)	9	1(11.1)
9	119	16(13.4)	110	8(7.3)	13	1(7.7)
10	144	31(21.5)	133	15(11.3)	15	3(20.0)
11	111	21(18.9)	103	21(20.4)	17	6(35.3)
12	145	19(13.1)	87	23(26.4)	7	3(42.9)
13	119	28(15.6)	83	21(25.3)	10	3(30.0)
14	83	13(15.7)	56	10(17.9)	7	2(28.6)
15	25	0(-)	18	8(44.4)	7	2(28.6)
	1055	176(16.7)	803	124(15.4)	95	22(23.2)