

# TYPE SPECIFICITY OF HAI ANTIBODY RESPONSES IN ISOLATES PROVEN PRIMARY DENGUE VIRUS INFECTION

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**OBJECTIVE :** To determine if the infecting virus type can reliably be identified by HAI serology in children with acute primary dengue virus infections.

**BACKGROUND :** In many patients with acute symptomatic dengue virus infections no virus can be isolated. In patients with secondary type antibody responses, both the HAI and PRNT patterns are broad and not type specific, i.e., it is impossible to establish the type of the infecting virus based on these conventional serologic approaches (see AFRIMS Annual Report, 1979-1980). It has been amply demonstrated by this lab and others that the PRNT antibody response in animal models and patients is type specific. However, the cumbersome nature of this assay precludes its routine use. We therefore sought, by retrospective record review, to determine if the HAI antibody response in Thai children with acute primary dengue infections was type specific.

**METHODS :** AFRIMS Laboratory records for the years 1974 through 1979 were reviewed and a panel of cases was assembled which met the following criteria :

1. A dengue virus isolate was obtained from the patient during the acute phase of illness and typed by the PRNT method.
2. Acute and convalescent (>7 days) serum specimens were obtained and simultaneously tested for HAI antibody titers against dengue types 1-4 and JEV.
3. The acute HAI titers were equal to or less than 20 against all antigens.
4. The convalescent HAI titers were not greater than 640 against all antigens.

**RESULTS :** 21 cases were found which met the above criteria. The virus type, case number, day of illness of specimens, and HAI antibody responses are listed in Table I. The following generalization can be made about symptomatic primary dengue virus infections in Thai children.

1. Early HAI antibody appears to be distinctly homotypic.
2. Late HAI antibody is relatively homotypic; however as performed at the AFRIMS lab a heterotypic D4 antigen often gives a higher titer than homotypic D1, D2 or D3 antigens.

If the highest convalescent titer is directed against D1, D2 or D3, than that is probably the infecting type. If the highest convalescent titer is directed against D4, then it is impossible to determine the infecting type with any degree of certainty by HAI.

Table 1.

| Virus | Case # | Day | HAI |     |     |     |     |
|-------|--------|-----|-----|-----|-----|-----|-----|
|       |        |     | D1  | D2  | D3  | D4  | JE  |
| D1    | 74-044 | 0   | 0   | 0   | 0   | 0   | 0   |
|       |        | 2   | 0   | 0   | 0   | 0   | 0   |
|       |        | 4   | 80  | 20  | 80  | 160 | 160 |
|       |        | 16  | 80  | 20  | 40  | 80  | 40  |
|       |        | 29  | 40  | 20  | 40  | 80  | 40  |
| D1    | 74-063 | 0   | 0   | 0   | 0   | 0   | 0   |
|       |        | 2   | 20  | 0   | 0   | 0   | 0   |
|       |        | 3   | 20  | 0   | 0   | 0   | 0   |
|       |        | 15  | 40  | 0   | 40  | 40  | 20  |
|       |        | 29  | 40  | 0   | 20  | 20  | 20  |
| D1    | 74-095 | 0   | 0   | 0   | 0   | 0   | 0   |
|       |        | 2   | 0   | 0   | 0   | 0   | 0   |
|       |        | 4   | 80  | 40  | 20  | 0   | 0   |
|       |        | 14  | 160 | 160 | 160 | 320 | 160 |
|       |        | 28  | 80  | 80  | 80  | 160 | 80  |
| D1    | 73-009 | 0   | 0   | 0   | 0   | 0   | 0   |
|       |        | 36  | 160 | 40  | 160 | 160 | 80  |
|       |        | 270 | 80  | 40  | 80  | 40  | 20  |
| D1    | 73-061 | 0   | 0   | 0   | 0   | 0   | 0   |
|       |        | 3   | 20  | 0   | 10  | 0   | 0   |
|       |        | 13  | 320 | 40  | 160 | 320 | 80  |
|       |        | 33  | 160 | 40  | 80  | 160 | 80  |
|       |        | 270 | 40  | 20  | 40  | 20  | 20  |
| D1    | RA-017 | 0   | 0   | 0   | 0   | 0   | 0   |
|       |        | 1   | 0   | 0   | 0   | 0   | 0   |
|       |        | 3   | 0   | 0   | 0   | 0   | 0   |
|       |        | 7   | 20  | 0   | 20  | 20  | 0   |
|       |        | 14  | 80  | 40  | 80  | 160 | 160 |
| 21    | 80     | 40  | 160 | 160 | 160 |     |     |
| D2    | 79-120 | 0   | 0   | 10  | 0   | 10  | 0   |
|       |        | 14  | 80  | 160 | 160 | 320 | 80  |
| D2    | 79-202 | 0   | 0   | 0   | 0   | 0   | 0   |
|       |        | 2   | 0   | 40  | 0   | 0   | 0   |
|       |        | 17  | 20  | 160 | 80  | 80  | 40  |
|       |        | 170 | 10  | 80  | 40  | 40  | 20  |

| Virus | Case #  | Day | HAI |     |     |     |     |
|-------|---------|-----|-----|-----|-----|-----|-----|
|       |         |     | D1  | D2  | D3  | D4  | JE  |
| D2    | 78-091  | 0   | 0   | 0   | 0   | 0   | 0   |
|       |         | 14  | 20  | 80  | 40  | 160 | 20  |
| D2    | CH-404K | 0   | 0   | 0   | 0   | 0   | 0   |
|       |         | 1   | 20  | 40  | 20  | 40  | 40  |
|       |         | 2   | 20  | 80  | 20  | 80  | 40  |
|       |         | 7   | 40  | 160 | 80  | 320 | 80  |
| D3    | 77-102  | 0   | 0   | 0   | 0   | 0   | 0   |
|       |         | 15  | 80  | 40  | 320 | 160 | 80  |
| D3    | 77-111  | 0   | 0   | 0   | 0   | 0   | 0   |
|       |         | 14  | 80  | 40  | 160 | 320 | 160 |
| D3    | 76-007  | 0   | 0   | 0   | 0   | 0   | 0   |
|       |         | 1   | 0   | 0   | 20  | 20  | 0   |
|       |         | 2   | 10  | 0   | 40  | 40  | 0   |
|       |         | 3   | 20  | 20  | 80  | 160 | 20  |
|       |         | 13  | 160 | 80  | 640 | 640 | 320 |
|       |         | 28  | 80  | 80  | 640 | 640 | 320 |
| D3    | 75-106  | 0   | 0   | 0   | 0   | 0   | 0   |
|       |         | 4   | 10  | 0   | 40  | 10  | 10  |
|       |         | 15  | 80  | 40  | 320 | 160 | 160 |
| D3    | 75-175  | 0   | 0   | 0   | 0   | 0   | 0   |
|       |         | 2   | 0   | 0   | 0   | 0   | 0   |
|       |         | 28  | 160 | 80  | 320 | 320 | 320 |
| D3    | 75-279  | 0   | 0   | 0   | 0   | 0   | 0   |
|       |         | 14  | 40  | 40  | 160 | 320 | 80  |
| D3    | 74-103  | 0   | 0   | 0   | 0   | 0   | 0   |
|       |         | 3   | 0   | 0   | 0   | 0   | 0   |
|       |         | 25  | 20  | 20  | 160 | 80  | 80  |
| D3    | 73-017  | 0   | 0   | 0   | 0   | 0   | 0   |
|       |         | 11  | 80  | 80  | 320 | 320 | 160 |
| D3    | 73-019  | 0   | 0   | 0   | 0   | 0   | 0   |
|       |         | 35  | 40  | 40  | 160 | 160 | 40  |
| D3    | 73-054  | 0   | 0   | 0   | 0   | 0   | 0   |
|       |         | 30  | 0   | 0   | 40  | 20  | 40  |

| Virus | Case # | Day | HAI |    |    |     | JE |
|-------|--------|-----|-----|----|----|-----|----|
|       |        |     | D1  | D2 | D3 | D4  |    |
| D3    | 77-493 | 0   | 0   | 0  | 20 | 0   | 0  |
|       |        | 7   | 20  | 0  | 80 | 10  | 0  |
| D4    | 77-195 | 0   | 0   | 0  | 0  | 20  | 0  |
|       |        | 27  | 40  | 40 | 80 | 640 | 80 |