DETECTION OF JAPANESE ENCEPHALITIS VIRUS IgM ANTIBODIES BY ANTIBODY CAPTURE SOLID PHASE RADIOIMMUNOASSAY

Principal Investigators : Donald S. Burke, LTC, MC, M.D.
Ananda Nisalak, M.D.

Assistant Investigators : Vipa Thirawuth
Sumitda Narupiti

OBJECTIVE : To develope a rapid, sensitive assay for detection of anti-JEV IgM antibodies.

RESULTS : An assay for detecting human IgM antibodies to Japanese encephalitis (JE) virus in serum specimens was developed using the "reverse" solid phase radioimmunoassay approach (JE IgM ACRIA). Heavy chain specific goat anti-human IgM anti-sera was first bound to the solid phase, and successive steps involved sequential binding of test sample IgM, acetone extracted mouse brain grown JE antigen, and iodine-125 labeled flavivirus hyperimmune human IgG.

Among 20 patients hospitalized in Bangkok with clinical diagnoses of acute encephalitis, and with acute flavivirus infections proven by hemagglutination inhibition (HAI) serology, 16 had detectable P/N ratio > 3.0) JE IgM ACRIA antibodies in the acute serum specimen and 19 in the convalescent serum specimen. Convalescent patient sera regularly had higher P/N values than the corresponding acute sera (mean ± 1 S.D. = 13.0 ± 9.3 using acute sera and 25.8 ± 19.6 using convalescent sera). JEV infected patients with HAI serologic responses indicative of a primary flavivirus infection had higher JE IgM ACRIA P/N responses than did those patients whose serologic response indicated past exposure to other flaviviruses. None of 30 serum specimens from healthy Thai adults and children with serum JE hemagglutination inhibition (HAI) antibodies had detectable JE IgM ACRIA activity (P/N ratios all less than 3.0).

Biologic false positives with low P/N ratios (range 3 to 14) were found in sera from patients with acute or recent infections with flaviviruses other than JEV but could be differentiated by the fact that these sera gave higher P/N ratios with homologous antigens than with JEV. False positive reactions with low P/N ratios (range 3 to 6) due to serum rheumatoid factor activity were differentiated by testing with control antigen.

The JE IgM ACRIA technique permits a rapid, accurate diagnosis of acute JEV infections both in patients with or without previous exposure to flaviviruses.

A manuscript detailing this work has been submitted for publication.