LABORATORY SURVEILLANCE FOR WEST NILE VIRUS AND ST. LOUIS ENCEPHALITIS
VIRUS IN MARYLAND FROM 2008 TO 2009

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BACKGROUND

• West Nile Virus (WNV)
  • An arthropod-borne virus (arbovirus) in the family Flaviviridae.
  • The leading cause of arboviral encephalitis in the United States.
  • Transmitted by the Culex species mosquitoes, particularly Cx. pipiens, Cx. tarsalis, and Cx. quinquefasciatus.
  • 80% of WNV infections are asymptomatic
  • Less than 1% of infected persons develop neuroinvasive disease.
  • St. Louis encephalitis virus (SLEV)
    • Also an arbovirus in the family Flaviviridae.
    • Transmitted by Cx. pipiens and Cx. quinquefasciatus in the east, Cx. nigripalpus in Florida, and Cx. tarsalis and members of the Cx pipiens complex in western states.
    • Less than 1% of SLEV infections are clinically apparent.
    • About 40% of children and young adults with SLEV disease develop mild symptoms but almost 90% of elderly persons with SLEV disease develop encephalitis.
    • The overall case-fatality ratio is 5 to 15%.

METHODS

Laboratory Diagnostic Tests

• Serological testing of serum or cerebrospinal fluid (CSF) to detect virus-specific IgM and neutralizing antibodies.
  • Immunoglobulin M (IgM)-enzyme-linked immunosassay (MAC-ELISA) and microsphere-based immunosassay (MIA) that utilizes xMAP technology
  • Polystyrene microspheres are covalently linked to a flavivirus group-reactive monoclonal antibody
  • IgG-depleted serum and an anti-human IgM phycoerythrin conjugate are added concurrently to the reaction mixture
  • The mixture is incubated, and then the median fluorescent intensities (MFIs) are determined.
  • Data transformation Excel add-in program available from CDC.

RESULTS

Table 1. Laboratory testing results of 479 patient specimens by MAC-ELISA and MIA

<table>
<thead>
<tr>
<th>MIA Results (N=479)</th>
<th>Negative</th>
<th>Equivocal</th>
<th>High Bkgd</th>
<th>SLEV</th>
<th>WNV</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAC-ELISA Results (N=479)</td>
<td>Total no. of Specimens</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>427</td>
<td>12</td>
<td>14</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>MIA</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>WNV</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>21</td>
</tr>
</tbody>
</table>

SUMMARY

• The WNV/SLEV MIA testing was 95% accurate compared to results obtained from MAC-ELISA testing.
  (Note: accuracy based on a strict comparison with MAC-ELISA results is not optimal because the MAC-ELISA testing alone is not 100% accurate, especially considering equivocal results.
  • MIA reduces turn-around time.
  • We intend that the duplex MIA will eventually replace the MAC-ELISA in our laboratory.

REFERENCES