



# Dengue Virus: A Diagnostic Testing Update

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## Disclosures

- None

## Presentation Outline

- Overview of dengue virus
- Clinical Presentation
- Diagnosis
  - Nucleic Acid Amplification Tests (NAATs)
  - Dengue Virus NS1 Antigen
  - IgM and IgG Antibodies to Dengue Virus
- Treatment and Prevention

# Dengue Virus – An Overview

- Member of the Flaviviridae family
  - Enveloped, +ssRNA viruses
- Four dengue virus serotypes (I-IV)
- Mosquito-borne Transmission:
  - *Aedes* spp
    - *A aegypti* and *A albopictus*
- Reservoir: Humans
- Transmission cycle:
  - Mosquito-human-mosquito

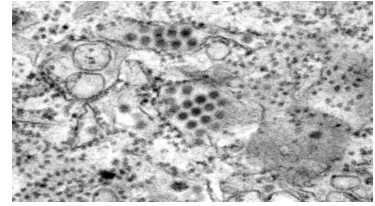


Image courtesy of CDC; Frederick Murphy  
<http://phil.cdc.gov/>

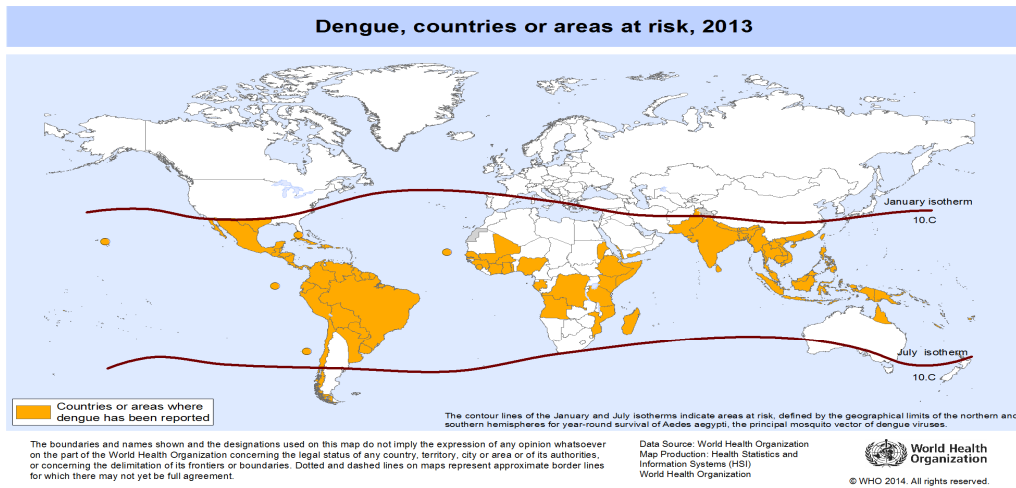


Image courtesy of CDC; James Gathany  
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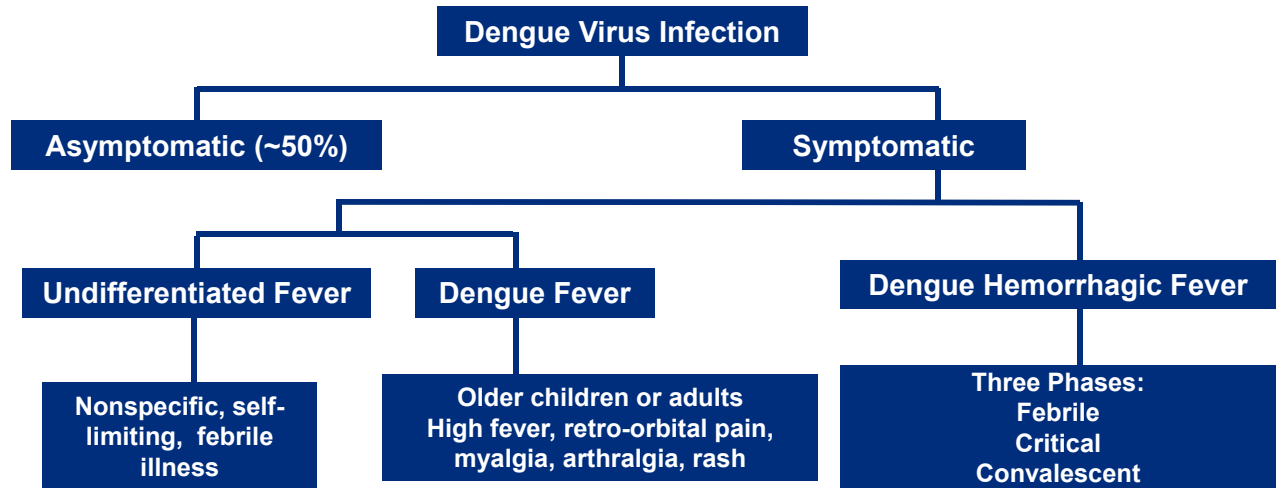
Image courtesy of CDC; James Gathany  
<http://phil.cdc.gov/>

# Dengue Virus: Epidemiology



<http://www.who.int/csr/disease/denque/impact/en/>

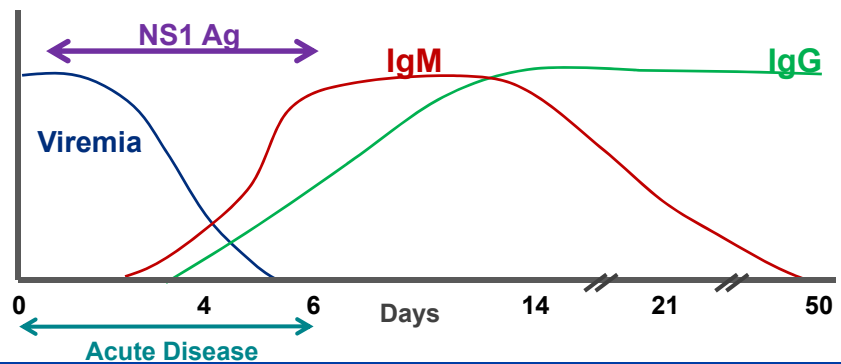
# Dengue Virus – Clinical Presentation



# Dengue Virus – Diagnostic Approaches

- Diagnosis is based on exposure history, clinical presentation and laboratory findings
- Available laboratory methodologies:

- Culture (CDC only)
- NAATs
- Serology
  - Antigen
  - Antibody

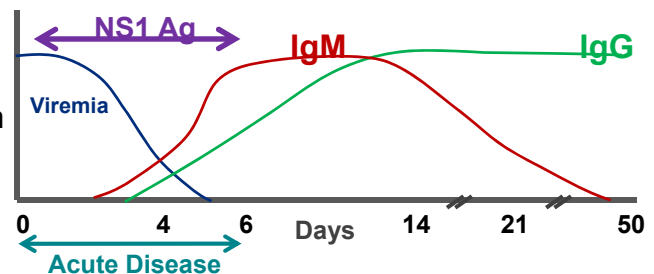


## NAATs for Dengue Virus Detection

- Two PCR Assays:
  - Dengue Virus, Molecular Detection, PCR, Serum (Mayo Test ID: DENG S)
  - Dengue Virus, Molecular Detection, PCR, Spinal Fluid (Mayo Test ID: DENG C)
- Useful for acute disease ( $\leq 5$  days of symptoms)
- No FDA-cleared assays
- Performance characteristics vary
  - Sensitivity: 80%-90%
  - Specificity: >95%
- Negative results do not rule-out infection
  - Follow-up with serology

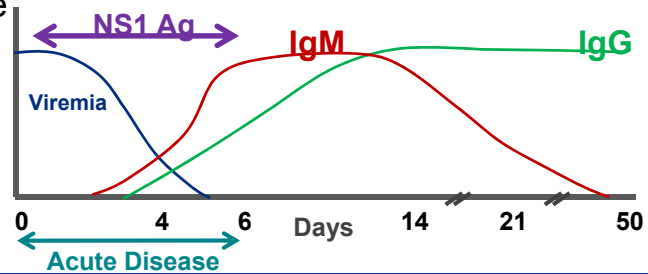
## Dengue Virus NS1 Antigen Detection

- NS1 Antigen (Mayo Test ID: DNSAG)
  - Conserved glycoprotein secreted from infected cells
  - **Acute Infection Marker!**
    - Detectable during viremic period
    - Detectable prior to development of IgM
    - Detectable for 1-9 days following symptom onset
  - Alternative to NAATs for detection of acute disease
- Performance characteristics:
  - Sensitivity: 96%
  - Specificity: 86%
- Also detectable following re-infection



## Antibody Detection to Dengue Virus

- Dengue Virus Antibody, IgG and IgM, Serum (Mayo Test ID: DENGGM)
  - Dengue Virus Antibody/Antigen Panel, Serum (Mayo Test ID: DENVP)
- **IgM Antibodies**
    - 3-5 days post illness onset
    - Persist for 30-90 days
    - FDA-cleared assay available
    - Sensitivity: 60%-99%
    - Specificity: 80%-98%
    - Flavivirus cross-reactivity
  - **IgG Antibodies**
    - >10 days post illness onset
    - Persist for years/decades
    - Flavivirus cross-reactivity



## Treatment & Prevention of Dengue Virus

- No targeted antiviral agents
- Supportive care only
  - Proper fluid management associated with decrease in disease mortality
  - Pain/fever management
- Avoid mosquito exposure while viremic
- Personal protective measures are recommended
- Dengvaxia vaccine
  - For people ages 9 through 16
  - Prior laboratory confirmed dengue infection
  - Live in an endemic area

## References

1. Guzman MG, Halstead SB, Artsob H, et al: Dengue: a continuing global threat. *Nature Rev Microbiol* 2010;8:S7-S16
2. Anderson NW, Jespersen DJ, Rollins L, et al: Detection of the dengue virus NS1 antigen using an enzyme immunoassay. *Diagn Microbiol Infect Dis* 2014;79(2):194-197
3. [www.cdc.gov](http://www.cdc.gov)
4. [www.who.org](http://www.who.org)