Chikungunya Virus – An Emerging Threat to the Americas

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Florida Chikungunya Webinar
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Chikungunya virus disease

- Mosquito-borne viral disease characterized by acute onset of fever and severe polyarthralgia
- Often occurs in large outbreaks with high attack rates
- Outbreaks have occurred in countries in Africa, Asia, Europe, and the Indian and Pacific Oceans
- In 2013, first locally-acquired cases in the Americas reported on islands in the Caribbean
Countries with reported local transmission of chikungunya virus*

*As of March 28, 2014
Chikungunya virus in the Americas*

- Nine Caribbean countries or territories and one country in South America have reported locally-acquired cases
- >40,000 suspected and laboratory-confirmed cases reported
- Virus expected to spread to new areas

*As of March 28, 2014
Chikungunya virus in the United States

- Chikungunya virus is not currently found in U.S.

- From 2006-2009, 106 laboratory-confirmed chikungunya cases identified in travelers visiting or returning to U.S.
  - None triggered a local outbreak in U.S.

- With outbreaks in Caribbean, number of chikungunya cases among U.S. travelers will likely increase

- Imported cases may result in virus introduction and local spread in some areas of U.S.
Chikungunya virus

- Single-stranded RNA virus
- Genus *Alphavirus*
- Family *Togaviridae*
- Closely related to Mayaro, O’nyong-nyong, and Ross River viruses
Mosquito vectors

- Predominantly *Aedes aegypti* and *Aedes albopictus*
- Same mosquitoes that transmit dengue
- Widely distributed throughout Americas
- Aggressive daytime biters
Primary transmission cycle

Anthroponotic transmission
(person to mosquito to person)
Other modes of transmission

- Documented rarely
  - *In utero* transmission resulting in abortion
  - Intrapartum from viremic mother to child
  - Percutaneous needle stick
  - Laboratory exposure

- Theoretical concern
  - Blood transfusion
  - Organ or tissue transplantation

- No evidence of virus in breast milk
Chikungunya virus infection

- Majority (72%–97%) of infected people develop clinical symptoms
- Incubation period usually 3–7 days (range 1–12 days)
- Primary clinical symptoms are fever and polyarthralgia
Fever and polyarthralgia

- **Fever**
  - Abrupt onset
  - Typically $\geq 39.0^\circ C \ (\geq 102.2^\circ F)$

- **Joint pain**
  - Often severe and debilitating
  - Involves multiple joints
  - Usually bilateral and symmetric
  - Most common in hands and feet
Other clinical signs and symptoms

- Headache
- Myalgia
- Arthritis
- Conjunctivitis
- Nausea/vomiting
- Maculopapular rash
Clinical laboratory findings

- Lymphopenia
- Thrombocytopenia
- Elevated creatinine
- Elevated hepatic transaminases
Atypical disease manifestations

- Uveitis
- Retinitis
- Hepatitis
- Nephritis
- Myocarditis
- Hemorrhage
- Myelitis
- Cranial nerve palsies
- Guillain-Barre syndrome
- Meningoencephalitis
- Bullous skin lesions*

*Primarily described in neonates
Risk factors for hospitalization or atypical disease

- Neonates exposed intrapartum
- Older age (e.g., >65 years)
- Underlying medical conditions (e.g., diabetes, hypertension, or cardiovascular disease)
Clinical outcomes

- Acute symptoms typically resolve in 7–10 days
- Mortality is rare; occurs mostly in older adults
- Some patients have relapse of rheumatologic symptoms* in the months following acute illness
- Studies report variable proportions of patients with persistent joint pains for months or years

*Polyarthritis, polyarthritis, tenosynovitis, Raynaud’s syndrome
Diagnostic testing

- Culture for virus*
- Reverse transcriptase-polymerase chain reaction (RT-PCR) for viral RNA
- Serology for IgM and confirmatory neutralizing antibodies
- Serology for ≥4-fold rise in virus-specific quantitative antibody titers on paired sera†

*Virus should be handled under biosafety level (BSL) 3 conditions
†Determined by plaque reduction neutralization test (PRNT) or immunofluorescence assay (IFA)
## Optimal timing for diagnostic assays

<table>
<thead>
<tr>
<th>Diagnostic assay</th>
<th>Days post-illness onset</th>
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<tbody>
<tr>
<td>Viral culture</td>
<td>≤3 days</td>
</tr>
<tr>
<td>RT-PCR</td>
<td>≤8 days</td>
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<tr>
<td>IgM antibody tests</td>
<td>≥4 days</td>
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Laboratories for diagnostic testing*

- Testing performed at:
  - Florida DOH BPHL
  - Two other state health departments (CA and NY)
  - CDC Arboviral Diseases Branch
  - One commercial laboratory (Focus Diagnostics)†

- Contact your county or state health department for information or to facilitate testing

*As of March 2014
†Testing may be ordered through other commercial laboratories and will be forwarded to Focus Diagnostics for testing
Distinguishing dengue from chikungunya

- Viruses transmitted by same mosquitoes
- Diseases have similar clinical features
- Viruses can circulate in same areas and cause co-infections
- Important to rule out dengue, as proper clinical management can improve outcome*

Clinical features of chikungunya virus infections compared with dengue virus infections

<table>
<thead>
<tr>
<th></th>
<th>Chikungunya</th>
<th>Dengue</th>
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<tbody>
<tr>
<td>Fever (&gt;39°C)</td>
<td>+++</td>
<td>++</td>
</tr>
<tr>
<td>Arthralgia</td>
<td>+++</td>
<td>+/-</td>
</tr>
<tr>
<td>Arthritis</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Headache</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Rash</td>
<td>++</td>
<td>+</td>
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<tr>
<td>Myalgia</td>
<td>+</td>
<td>++</td>
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<tr>
<td>Hemorrhage</td>
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<tr>
<td>Shock</td>
<td>-</td>
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<tr>
<td></td>
<td>Chikungunya</td>
<td>Dengue</td>
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<tr>
<td>Lymphopenia</td>
<td>+++</td>
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<tr>
<td>Neutropenia</td>
<td>+</td>
<td>+++</td>
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<tr>
<td>Thrombocytopenia</td>
<td>+</td>
<td>+++</td>
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<tr>
<td>Hemoconcentration</td>
<td>-</td>
<td>++</td>
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Differential diagnosis for chikungunya

- Dengue
- Leptospirosis
- Malaria
- Rickettsia
- Parvovirus
- Enterovirus
- Group A streptococcus
- Rubella
- Measles
- Adenovirus
- Post-infectious arthritis
- Rheumatologic conditions
- Other alphavirus infections (e.g., Mayaro, Ross River, Barmah Forest, O’nyong-nyong, and Sindbis viruses)
Treatment

- No specific antiviral therapy
- Supportive care with rest and fluids
- Non-steroidal anti-inflammatory drugs (NSAIDs) for acute fever and pain
  - In dengue endemic areas (or travelers returning from endemic areas), use acetaminophen until dengue can be ruled out
- Persistent joint pain may benefit from use of NSAIDs, corticosteroids, or physiotherapy
Surveillance

- Inform travelers going to areas with known virus transmission about risk of disease
- Consider chikungunya in patients with acute onset of fever and polyarthralgia
- Be aware of possible local transmission in areas where *Aedes* species mosquitoes are active
Suspected cases should be reported to state or local health departments to
- Facilitate diagnosis
- Mitigate risk of local transmission

State health departments encouraged to report laboratory-confirmed cases to CDC
Preventive measures

- No vaccine or medication available to prevent infection or disease
- Primary prevention measure is to reduce mosquito exposure
- Advise persons at risk for severe disease to avoid travel to areas with ongoing outbreaks
- Protect infected people from further mosquito exposure during first week of illness
Mosquito prevention and control

- Use air conditioning or window/door screens
- Use mosquito repellents on exposed skin
- Wear long-sleeved shirts and long pants
- Empty standing water from outdoor containers
- Support local vector control programs
Selected references

Additional resources

- General information about chikungunya virus and disease: http://www.cdc.gov/chikungunya/
- Travel notices: http://wwwnc.cdc.gov/travel/notices

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.