Chikungunya Virus – An Emerging Threat to the Americas

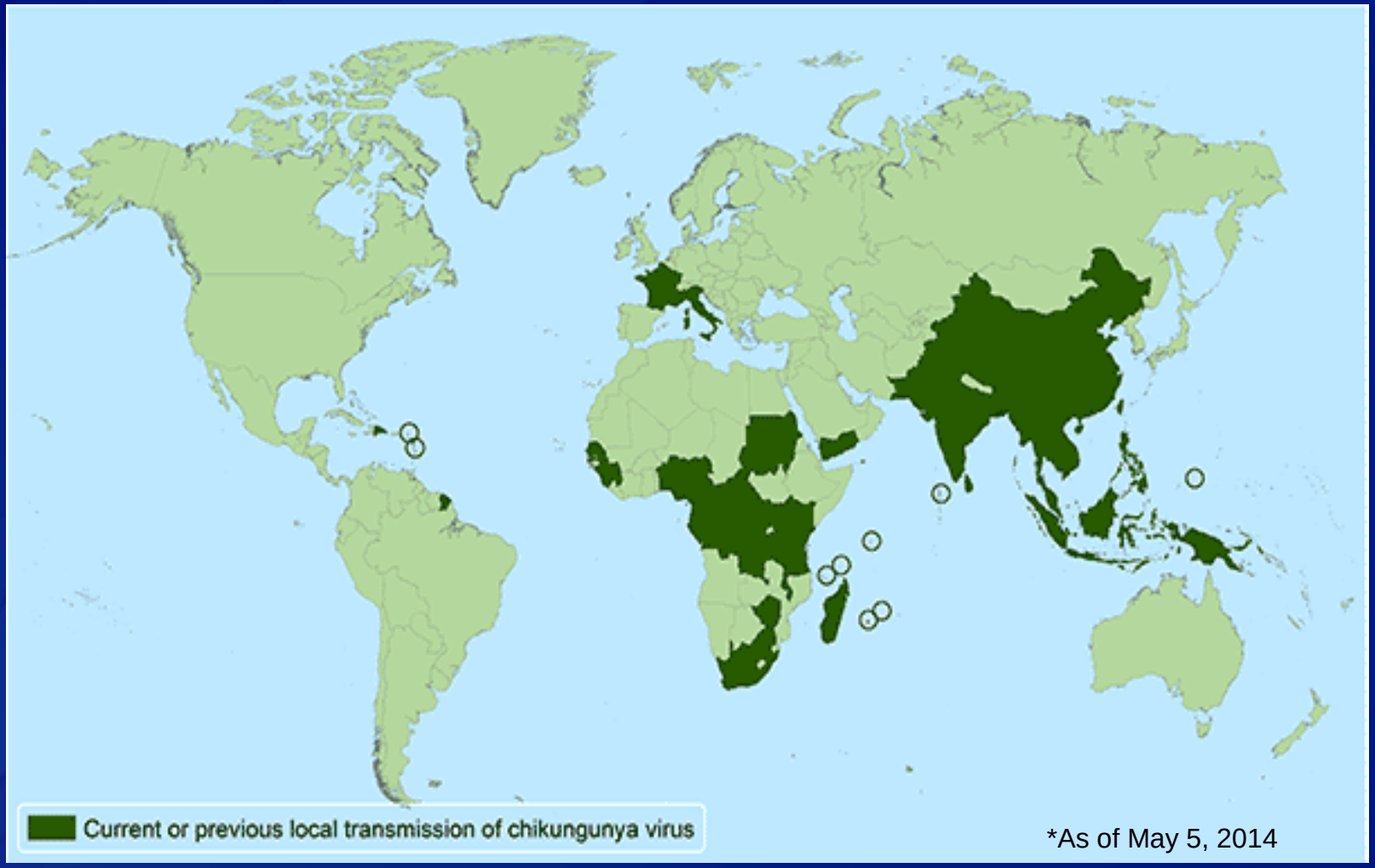
Arboviral Diseases Branch
Centers for Disease Control and Prevention

May 5, 2014

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 May 5, 2014

Chikungunya virus in the Americas*

- 12 Caribbean countries/ territories and one South American country have reported locally-acquired cases
- ~44,000 suspect and laboratory-confirmed cases reported
- Virus expected to spread to new areas

*As of May 5, 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

Aedes aegypti

Aedes albopictus

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 ≥39.0°C (≥102.2°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

*Polyarthralgia, 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

Diagnostic assay	Days post-illness onset
Viral culture	≤3 days
RT-PCR	≤8 days
IgM antibody tests	≥4 days

Laboratories for diagnostic testing*

- Testing performed at:
  - CDC Arboviral Diseases Branch
  - Several state health departments†
  - One commercial laboratory (Focus Diagnostics)‡
- Contact your state health department for information or to facilitate testing

*As of April 2014

† California, Florida, and New York

‡Testing may be ordered through other commercial laboratories and will be forwarded to Focus Diagnostics for testing

Distinguishing chikungunya from dengue

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

*WHO dengue clinical management guidelines: http://whqlibdoc.who.int/publications/2009/9789241547871_eng.pdf

Clinical features of chikungunya virus infections compared with dengue virus infections

	Chikungunya	Dengue
Fever (>39°C)	+++	++
Arthralgia	+++	+/-
Arthritis	+	-
Headache	++	++
Rash	++	+
Myalgia	+	++
Hemorrhage	+/-	++
Shock	-	+

Laboratory features of chikungunya virus infections compared with dengue virus infections

	Chikungunya	Dengue
Lymphopenia	+++	++
Neutropenia	+	+++
Thrombocytopenia	+	+++
Hemoconcentration	-	++

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)

Clinical management

- Assess hydration and hemodynamic status
- Evaluate for other serious conditions and treat or manage appropriately
- Collect specimens for diagnostic testing
- Manage as dengue until dengue ruled out
  - Proper clinical management of dengue reduces risk of severe disease and death
  - Aspirin and other NSAIDs can increase risk of hemorrhage in patients with dengue

Treatment

- No specific antiviral therapy
- Treatment is supportive
- Use acetaminophen or paracetamol for initial fever and pain control
  - If inadequate, consider using narcotics or NSAIDS
  - Do not use aspirin or other NSAIDs if suspect dengue until afebrile ≥48hrs and no dengue warning signs*
- Persistent joint pain may benefit from use of NSAIDs, corticosteroids, or physiotherapy

* Warning signs for severe dengue include severe bleeding, pleural effusion or ascites, lethargy, enlarged liver, and increased hematocrit with decrease in platelet count

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

Reporting of chikungunya cases

- 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 people 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

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Additional resources

- General information about chikungunya virus and disease: http://www.cdc.gov/chikungunya/
- Protection against mosquitoes: http://wwwnc.cdc.gov/travel/yellowbook/2014/chapter-2-the-pre-travel-consultation/protection-against-mosquitoes-ticks-and-other-insects-and-arthropods
- Travel notices: http://wwwnc.cdc.gov/travel/notices
- Information for travelers and travel health providers: http://wwwnc.cdc.gov/travel/yellowbook/2014/chapter-3-infectious-diseases-related-to-travel/chikungunya
- Chikungunya preparedness and response guidelines: http://new.paho.org/hq/index.php?option=com_docman&task=doc_download&gid=16984&Itemid

Questions

For more information please contact Centers for Disease Control and Prevention

Telephone: 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348

E-mail: cdcinfo@cdc.gov Web: http://www.cdc.gov

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.