

# Chikungunya

## Epidemiology

**Source:** Humans mostly  
In Africa, few mammals:  
Monkeys, squirrels, bats



Mosquito ready to infect another human

Extrinsic incubation period: 5-7 days



Mosquito feeds on a Human

**Transmission Mosquitoes:**  
*Aedes aegypti* and *albopictus*

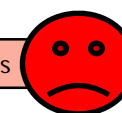
-Similar habits & breeding sites:  
-**Daytime** feeder (early & late in day)  
-Breed in **artificial containers** around home: paint cans, old tires, clogged rain gutters, pet watering dishes



Intrinsic incubation period: 4 days



Viremia: 4-5 days



**Skin rash**  
-Occurs (50% of cases)  
-Flush over the face and trunk  
-Maculopapular  
-Trunks and limbs  
-Some lesions on face, palms and soles  
-Pruritis or irritation may accompany the eruption

**Arthralgia:**  
▪ polyarticular, migratory  
▪ May be severe  
▪ Hand, wrist, ankle, feet joints  
▪ Pain on movement is worse in the morning, improved by mild exercise, and exacerbated by strenuous exercise  
▪ Generalized myalgia, as well as back and shoulder pain, is common.

**Most are asymptomatic**  
**Sudden onset**  
Fever: 39°-40°C, chills, may remit, then up (saddle back)  
Pains: arthralgias, myalgias, low back pain, headache

-Full recovery usual  
-Some patients w persistent joint or symptoms for weeks / months  
-Serious complications: neuroinvasive disease rare, no fatalities  
Fatal cases not documented conclusively

-***Ae. albopictus*** = Asian tiger mosquito  
- Accidentally introduced from Japan in 1985 in Houston, Spread in central & southern U.S., replacing native *Ae. aegypti*  
- Today primary pest mosquito in many towns and cities  
Extremely difficult to control by standard mosquito spraying (truck or airplane) because of close proximity to houses & daytime feeding



*albopictus*

*aegypti*



-Isolated in Tanzania 1953  
-1960s - 1980s, virus isolated from western Africa (Senegal & Nigeria), central, southern Africa and many areas of Asia  
-Since, numerous **epidemics** in both Africa and Southeast Asia, involving 100,000s of people

## Diagnosis

In U.S. diagnostic tests for CHIK infection not available commercially but available at CDC by special arrangement through state health departments.

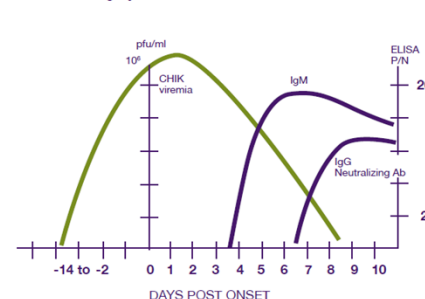
- Antibody-capture IgM ELISA
- Immunofluorescence assay (IFA) for CHIK IgG and IgM
- Plaque-reduction neutralization tests (PRNT)
- Virus isolation
- RT-PCR assays (Reverse Transcriptase Polymerase Chain Reaction)
- Serologic tests on both acute- and convalescent-phase serum

Do not delay submission of acute-phase samples pending collection of convalescent-phase samples

-**TIMING:** ≤5 days after onset → RT-PCR, ≥5days after onset → Serology

ALPHA virus: RNA, single stranded, with envelope and capsid  
Isolated in Tanzania 1953

Figure 2. Viremia and immune response following Chikungunya virus infection.



## Treatment

Treatment is **symptomatic or supportive:**

- Rest and the use of
  - To relieve fever: acetaminophen or paracetamol
  - To relieve arthritic component: ibuprofen, naproxen, or another non-steroidal anti-inflammatory agent (NSAID) to relieve the arthritic component
- Aspirin is NOT advised because of bleeding risk and risk of developing Reye's syndrome in children younger than 12 years
- In patients with severe joint pains not relieved by NSAID, narcotics (e.g., morphine) or short-term corticosteroids can be used
- Drink plenty of fluids to replenish fluid lost from sweating, vomiting, and other insensible losses

## Surveillance

### 1-Determine if case was imported or autochthonous 2-Once an autochthonous case of CHIK is detected, an in-depth epidemiologic investigation must be conducted to:

- Track viral spread.
- Monitor for possible introduction into surrounding areas.
- Describe key epidemiologic and clinical features.
- Assess clinical severity and impact on society (e.g., days missed from work, school closures, etc.).
- Identify risk factors for infection or severe disease.
- Identify circulating CHIKV lineages.

### Case Detection

-Consider CHIK in the differential diagnosis for individuals who are presenting

- **fever and arthralgias that are not explained by another etiology**
- have an atypical presentation; atypical dengue with severe joint pain or conjunctivitis.
- Suspect if association with traveler recently returned from an area with ongoing CHIK
- Small clusters of disease (fever and arthralgia or arthritis)
- Increase in hospital visits for fever and arthralgia or arthritis occurring in a localized area in a short time.

### Case Definition

**Suspect case:** patient with acute onset of fever  $>38.5^{\circ}\text{C}$  ( $101.3^{\circ}\text{F}$ ) and severe arthralgia or arthritis not explained by other medical conditions, and who resides, or has visited epidemic or endemic areas within two weeks prior to the onset of symptoms.

**Confirmed case:** suspect case with any of the following CHIK specific tests:

- Viral isolation.
- Detection of viral RNA by RT-PCR.
- Detection of IgM in a single serum sample (collected during acute or convalescent phase).
- Four-fold increase in CHIKV-specific antibody titers (samples collected at least two to three weeks apart).

### Case Definition during an epidemic, all patients need not be subjected to confirmatory tests as above. An epidemiologic link can be sufficient.

Sensitivity and specificity for clinical criteria for CHIKV infection during outbreak of the disease: combination of fever and polyarthralgias

- sensitivity 84%
- specificity 89%
- correct classification 87% of individuals with serologically confirmed CHIKV infection.

## Vector Surveillance & Control

• For arboviruses with a human-mosquito-human transmission cycle, **the most important source of viral importation is the viremic traveler.**

### Mosquito Control at Airport not useful

- Mosquito abatement activities at international airports
- Spraying adulticides in passenger cabins of arriving international flights
- ➔ virus-infected mosquitoes arriving in passenger aircraft are not considered as significant sources of most arboviral importations.
- No need to place any restrictions on baggage, cargo, containers, goods, or postal parcels beyond usual practices
- For arboviruses with a human-mosquito-human transmission cycle, **the most important source of viral importation is the viremic traveler.**
- **Travel Health Alert Notices (THANs)** to international travelers

### 1. Vector Surveillance and Identification of High Risk Areas

-Systematically collect surveillance data on relative densities of *Ae. aegypti* and *Ae. albopictus*. Surveillance methods for *Ae. aegypti* and *Ae. albopictus* are varied and include methods to monitor egg production, larval sites, pupal abundance, and adult abundance.

-Detect and identify hidden and difficult to control larval sites (e.g., cryptic locations such as septic tanks, storm drains, sump pumps, and vacant lots), and other productive sites, as well as the readily identified and commonly found larval habitats.

### 2. Personal Protection

-Personal repellents on skin or clothing. DEET (N,N-diethyl-m-toluamide) and picaridin (also known as KBR3023 or Bayrepel™) are effective

-Infants and others sleeping or resting during the day should use bed nets to avoid infection from *Ae. aegypti* and *Ae. albopictus*, both of which are day-biting mosquitoes.

-Those potentially infected with CHIKV during an outbreak must **rest beneath an IT bed net** to avoid mosquito bites and further spread of infection. Use of IT bed nets has the additional benefit of killing mosquitoes that come into contact with the net.

### 3. Household Prevention

-Screens on windows and doors reduce entry of vectors into the home.

-Mosquito proofing water storage vessels reduce oviposition sites and local production.

-Use commercially-available **pyrethroid-based aerosol sprays** and other products: mosquito coils and electronic mat vaporizers. Aerosol sprays may be applied throughout the home, but areas where adult mosquitoes rest (dark, cooler areas) must be targeted, including bedrooms, closets, clothing hampers, etc. Care should be taken to emphasize proper use of these products when advocating their application to the public, in order to reduce unnecessary exposure to pesticides.

### 4. Neighborhood and Community Prevention

Effective communication to the community and various stakeholders is crucial to avoid confusion and misinformation and to engage people in steps to reduce the risk of disease.