In the name of God

Chikongunya virus

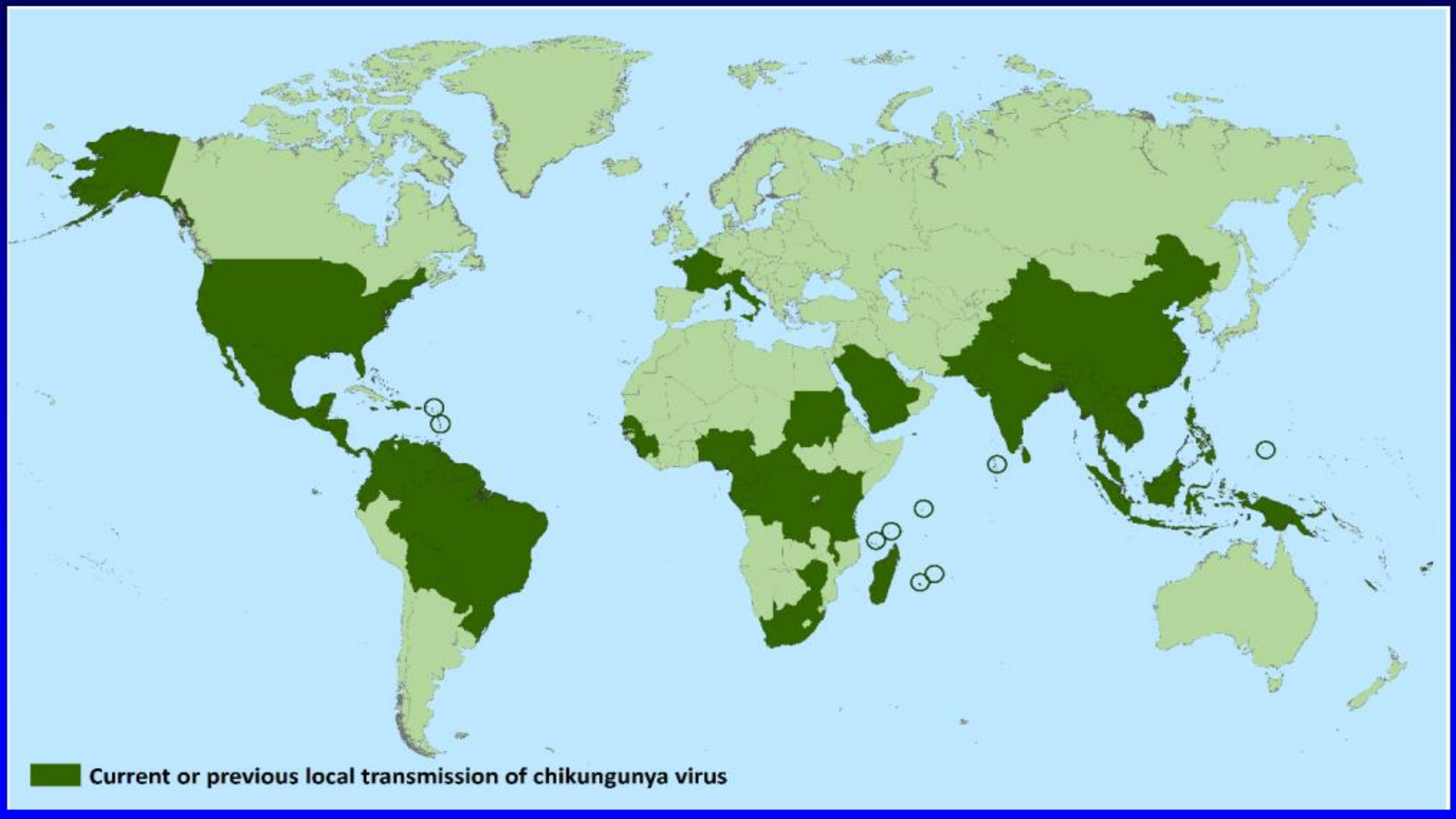
Dr.h.mazaherpour

Assistant professor of infectious disease AUMS

- **Chikungunya** is a relatively rare form of viral fever ("debilitating non-fatal viral illness.") caused by an alphavirus that is spread by mosquito bites from the *Aedes aegypti* mosquito.

EPIDEMIOLOGY

- Chikungunya was first described in Tanzania, Africa in 1952.
- An outbreak of chikungunya was discovered in Port Klang in Malaysia in 1999 affecting 27 people.
- In February 2005, an outbreak was recorded on the French island of Réunion in the Indian Ocean. As of May 18, 2006, 258,000 residents have been hit by the virus in the past year (out of a population of about 777,000). official deaths have been associated with chikungunya.


Current or previous local transmission of chikungunya virus

- In neighboring Mauritius, 3,500 islanders have been hit in 2005.
- There have also been cases in Madagascar, Mayotte and the Seychelles.
- The name is derived from the Makonde word meaning "that which bends up" in reference to the stooped posture developed as a result of the arthritic symptoms of the disease.

- The disease was first described by Marion Robinson and W.H.R. Lumsden in 1955, following an outbreak on the Makonde Plateau, along the border between Tanganyika and Mozambique, in 1952.
- Chikungunya is not considered to be fatal. However, in 2005-2006, 200 deaths have been associated with chikungunya on Réunion island.

- first reported in India in 1963 — had returned after a three-decade dormancy and 121 districts across seven States were affected by it with a total of 974,541 suspected cases. Of the 10,611 samples sent to laboratories, 992 tested positive.
- In 2006, there was a big outbreak in the Andhra Pradesh state in India. Nearly 200,000 people were affected by this disease.

- In Bangalore (India), there seems to be an outbreak of CHIK now (May 2006) with arthralgia/arthritis, rashes.
- A separate outbreak of chikungunya fever was reported from Malegaon town in Nasik district, Maharashtra state, in the first two weeks of March 2006, resulting in over 2000 cases. In Orissa state, amost 5000 cases of fever with muscle achesand headache were reported between February 27 and March 5, 2006.

Virus classification

- **Group: single strand RNA virus**
- **Family: *Togaviridae***
- **Genus: *Alphavirus***

VECTOR

- It is transmitted by **AEDES,CULEX** and **MANSONIA** species

- **Mosquitoes - *Aedes aegypti,***
  Aedes albopictus

Aedes aegypti mosquito

AEDES MOSQUITOES

- Household container breeders
- Breeds in
  - clean water
  - In all stored water for drinking, washing and bathing
  - Rainwater collected in unused materials like coconut shells, mud pots, plastic cups, tyres etc

HOST

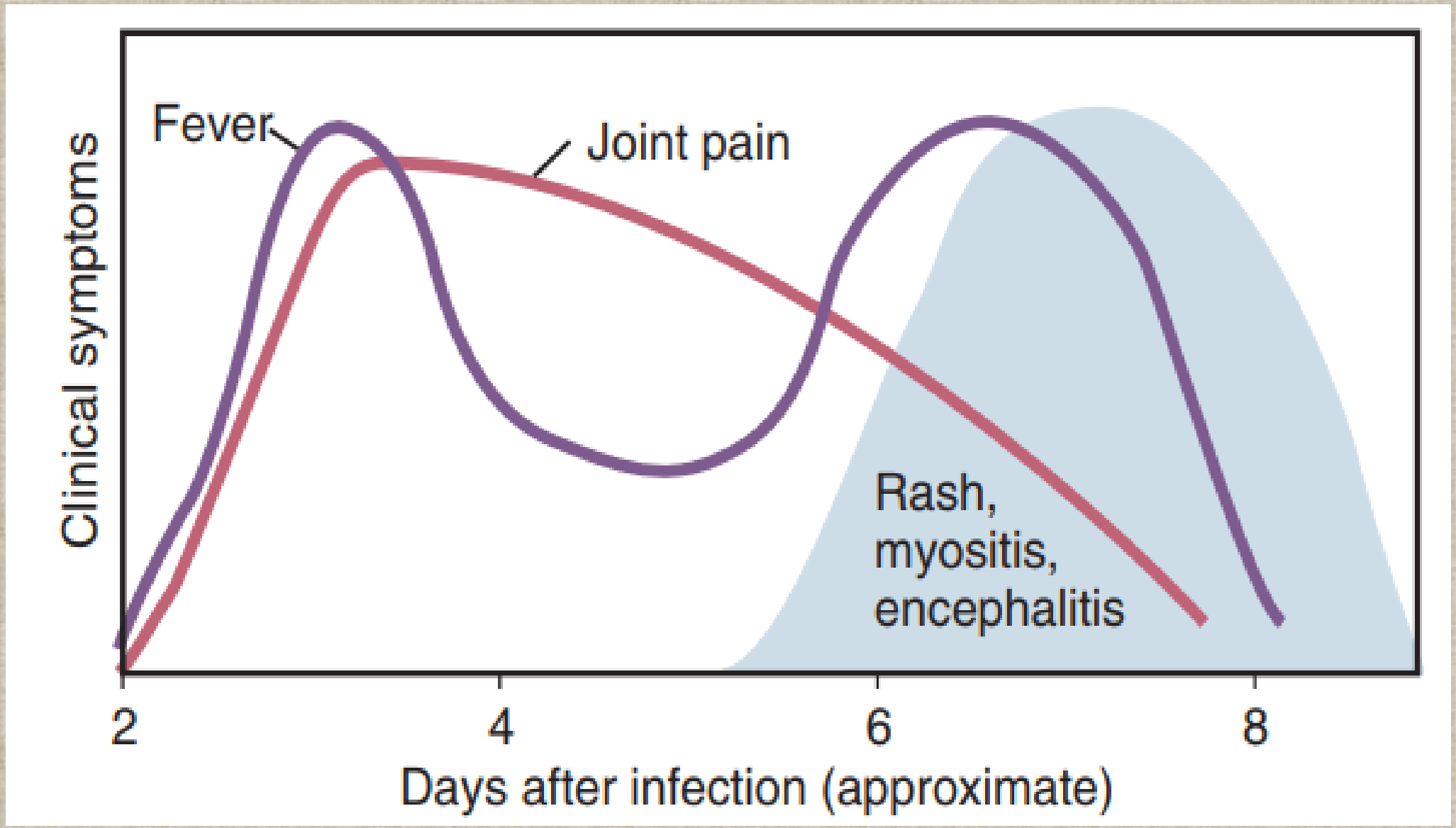
- MAN
- The main virus reservoirs are monkeys, but other primates, mammals and birds can also be affected
- **Major period of activity – sunrise and sunset**

TRANSMISSION

- This virus is transmitted only by mosquitoes
- The mosquito picks up the virus from an infected person during the viraemic period – within five days from the day of starting of symptoms
- An infected mosquito will remain infected all its life span and can transmit the virus each time it bites
- An infected person cannot spread the infection directly to other persons

SYMPTOMS

- The incubation period ranges from 1 to 12 days.
- Body temperature as high as 40°C and is often accompanied by shaking chills. The fever curve may be “saddleback”(recurrent fever lasting <24h); fever may abate 4 to 8 days after onset in concert with the level of viremia and then recrudesce to peak readings for up to 2 weeks.


Fever
Joint pain
Rash,
myositis,
encephalitis
Clinical symptoms
2
4
6
8
Days after infection (approximate)

- Petechial or Maculopapular Rash Usually Involving the Limbs and trunk, face, palms, and soles.
- Biopsy of the maculopapular-to-macular rash in CHIK infection shows lymphocytic perivascular cuffing and extravasation of erythrocytes from superficial capillaries.
- The rash characteristically appears on the first day of illness, but onset may be delayed

- Arthralgia is polyarticular, favoring the small joints and sites of previous injuries, and is most intense on arising. Patients typically avoid movement as much as possible. Joints may swell without significant fluid accumulation.
- These symptoms may last from 1 week to several months and are accompanied by myalgia.
- Headache, photophobia, retro-orbital pain, sore throat with objective signs of pharyngitis, nausea, and vomiting also occur in this setting.

Simon et al. Medicine, 2007
Godaert, JAGS 2018

Maculo-papular exanthema

Diffuse hyperemia

Facial oedema

Distal subcutaneous oedema

Symptom or sign	Frequency range (% of symptomatic patients)
Fever	76–100
Polyarthralgias	71–100
Headache	17–74
Myalgias	46–72
Back pain	34–50
Nausea	50–69
Vomiting	4–59
Rash	28–77
Polyarthritis	12–32
Conjunctivitis	3–56

Table 2. **Atypical manifestations of CHIKV infection.**

System	Clinical manifestations
Neurological	Meningoencephalitis, encephalopathy, seizures, Guillain-Barré syndrome, cerebellar syndrome, paresis, palsies, neuropathy
Ocular	Optic neuritis, iridocyclitis, episcleritis, retinitis, uveitis
Cardiovascular	Myocarditis, pericarditis, heart failure, arrhythmias, hemodynamic instability
Dermatological	Photosensitive hyperpigmentation, intertriginous aphthous-like ulcers, vesiculobullous dermatosis
Renal	Nephritis, acute renal failure
Other	Bleeding dyscrasias, pneumonia, respiratory failure, hepatitis, pancreatitis, syndrome of inappropriate secretion of antidiuretic hormone (SIADH), hypoadrenalism

Diagnosis

The diagnostic tests include detection of antigens or antibodies in the blood, using

- **ELISA (or EIA - enzyme immunoassay)**
- **polymerase chain reaction (PCR).**
- Laboratory test results may reveal a mild leukopenia with relative lymphocytosis. The erythrocyte sedimentation rate is usually markedly elevated, and the C-reactive protein is positive.

- Virus isolation can be performed on field collected mosquitoes or acute serum specimens (≤8 days).
- CSF in meningoencephalitis cases.
  - Synovial fluid in arthritis with effusion.
  - Autopsy material – serum or available tissues.

- Long-term joint involvement has been reported in association with **human leukocyte antigen B27**.
- Dengue virus and CHIKV can co-infect mosquitoes, and simultaneous transmission of both viruses to humans has been documented.

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

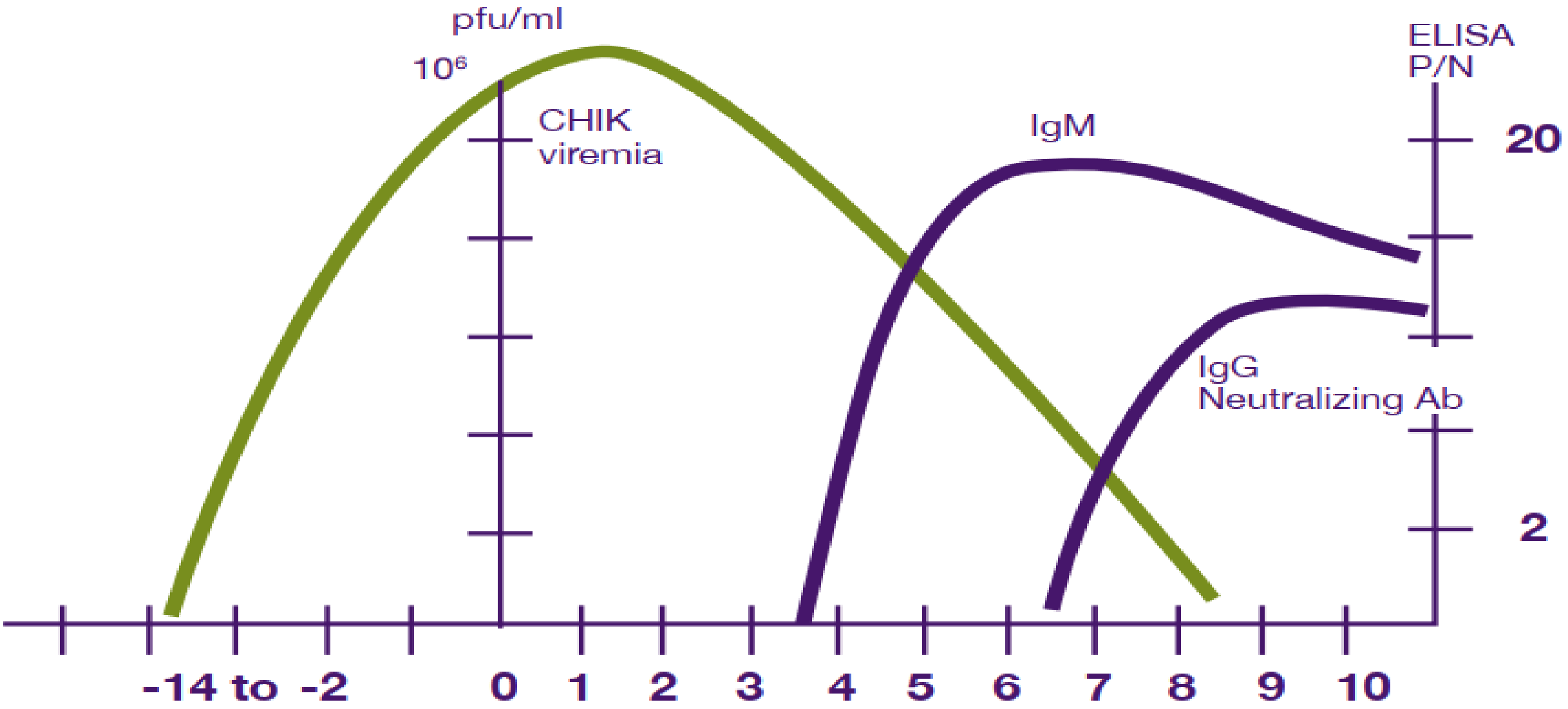


Table 6. **Typical results of samples tested at various time points post-infection.**

Days post illness onset	Virus testing	Antibody testing
Day 1-3	RT-PCR = Positive Isolation = Positive	IgM = Negative PRNT = Negative
Day 4-8	RT-PCR = Positive Isolation = Negative	IgM = Positive PRNT = Negative
>Day 8	RT-PCR = Negative Isolation = Negative	IgM = Positive PRNT = Positive

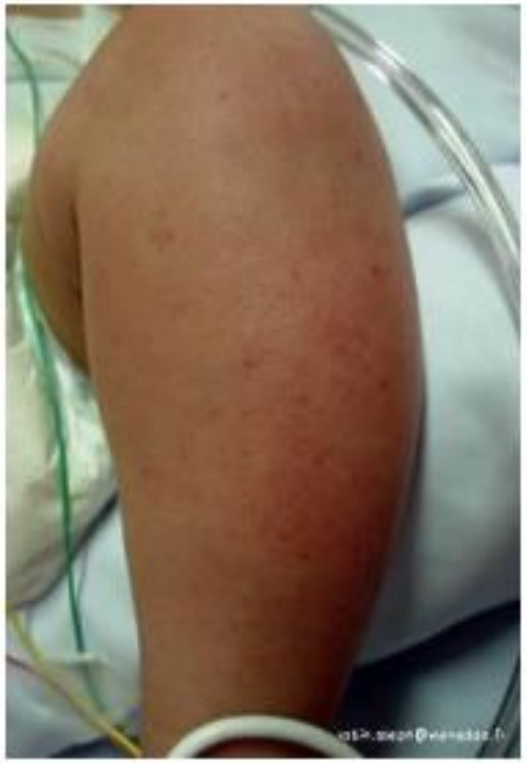
Clinical and laboratory features	Chikungunya virus infection	Dengue virus infection
Fever (>102°F or 39°C)	+++	++
Myalgias	+	++
Arthalgias	+++	+/-
Headache	++	++[b]
Rash	++	+
Bleeding dyscrasias	+/-	++
Shock	-	+
Leukopenia	++	+++
Neutropenia	+	+++
Lymphopenia	+++	++
Elevated hematocrit	-	++
Thrombocytopenia	+	+++

complications

- neurological complications such as **meningoencephalitis** have been reported in a small proportion of patients
- **Mother to child transmission** of chikungunya virus was a new observation recorded during the recent French Reunion islands outbreak.
- Mother-to-child transmission of CHIKV infection was demonstrated in a retrospective study of neonates. Clinical signs seen in 38 infants included fever (79%), rash (82%), pain (100%), and peripheral edema (58%).

- **Per-partum viremia** (7 days before - 2 days after delivery)
  - 50% vertical transmission
  - No protection by caesarian section protection
  - **Neonatal infection within the first week of life**
  – Lethargy, fever, poor feeding, edema, erythrodermia followed by skin peeling

- Laboratory abnormalities included thrombocytopenia, lymphopenia, decreased prothrombin, and elevation of alanine aminotransferase. Virus was detected in the CSF of 22 of 24 infants evaluated by polymerase chain reaction (PCR)
- Myocardial hypertrophy, ventricular dysfunction, pericarditis, and coronary artery dilatation were documented in a minority of this group, and one neonate died of necrotizing enterocolitis.



- Symptoms are generally self-limiting and last 1–10 days.
- Arthralgia may persist for months or years.
- In some patients, minor hemorrhagic signs such as epistaxis or gingivorrhagia have also been described

- **Case fatality rate close to that of seasonal flu**
  – From 0.3-1/1,000 in Reunion Island, 2006 and Martinique, 2014
  – Sometimes higher (Brazil, Colombia)
  - **Risk factors for chikungunya-associated severity and/or fatality**
  - Age ≥ 60 years, higher if ≥ 85 years; peripartum period
  - Hypertension, underlying cardiac disorders, diabetes
  - Use of NSAIDs, alcohol abuse
  - Systemic lupus

treatment

- There is no active treatment against chikv
- Presently treatment is purely symptomatic - supportive care and rest and nutrition
- Analgesics, antipyretics and fluid supplementation are important aspects in managing this infection.
- Chloroquine has proven ineffective in treatment of CHIK fever–related arthritis, but there has been some modest success with TNF blockers.

- Self-limiting and Will Resolve With Time.
- Supportive or Palliative Medical Care With Anti-inflammatories
- Vaccine Trials Were Carried Out in 2000, the Project Was Discontinued and There Is No Vaccine Currently Available.
- Supportive care with rest is indicated during the acute joint symptoms.
- Monoclonal antibodies are currently of major interest as potential prophylactic or therapeutic agents in CHIK fever

- Movement and mild exercise tend to improve stiffness and morning arthralgia, but heavy exercise may exacerbate rheumatic symptoms.
- aspirin and nonsteroidal anti-inflammatory drugs, chloroquine phosphate (250 mg/day) has given promising results."

vaccine

- Currently there is no marketable vaccine available for man
- Chikungunya confers a life-long immunity on the infected person.

prevention

- Elimination of stagnant water at home, schools and work place to avoid breeding of mosquitoes.
- Using insect repellents over the exposed parts of the body.
- Using mosquito screens or nets in non – Air-conditioned rooms.
- Wearing the long sleeved clothes like long trousers of a light shade for protection against mosquitoes.

- Properly covering all water tanks so that mosquitoes cannot get in
- Getting rid of any container capable of retaining water in the outdoor surroundings (used tyres, food cans, garbage, saucers under flower pots, etc)
- Renew water in flower vases at least once a week

control

- Aedes species is the main target of control
- Source reduction of breeding sites of mosquitoes
- Requires community involvement to keep the water storage containers free of mosquitoes
- Eliminate other breeding places in and around houses

- The organophosphorous insecticide ABATE is being used in a large scale
- ABATE can prevent breeding upto 3 months when applied to sand granules

- Aerosol spray of ultra low volume [ULV] of **MALATHION** or **SUMITHION** 250 ml/hectare is effective in interrupting transmission and stopping epidemics
- ULV treatments 10 days apart has shown to reduce mosquito densities more than 98%

- A person with chikungunya fever should limit their exposure to mosquito bites in order to avoid further spreading the infection, and should stay indoors or under a mosquito net.
- Before using repellents, pregnant women and children under the age of 12 years should consult a physician or pharmacist
- For newborn children under three months, repellents are not recommended ; instead, insecticide-treated bed nets should be used

Thanks for your attention