50 year old woman with fever, rash and chest pain from Mauritius in March 2006

2 week holiday in Mauritius returned 4 days ago
Injured leg and admitted to hospital on day 9 for antibiotics
Many patients on ward with fever
No mosquito bites remembered
4 days later fever and headache for 3 days
Improved as flew back to UK

Full immunisations, no malaria chemoprophylaxis
Now has 2 days of:

- Fever to 39° C
- Migratory joint pains
- Headache
- Photophobia
- Rash
- Pleuritic chest pain

Temp 38.9° C  P100
BP 120/85  RR 12
Discrete rash on legs
Chest clear
No neck stiffness
Joints normal
Investigations

Hb 11.0 g/dL (>11.5)
WBC 6.1 x 10^9/L
  Lymph 0.6 (1.5-4)
  Mono 0.2 (0.2-0.8)
  Neut 5.2 (2-7.5)
PIt 270 x 10^9/L (>150)
ESR 12 mm/hr

Malaria smears neg
Liver function normal

CXR normal
What is your diagnosis? (choose one)

1. Dengue
2. Malaria
3. Meningococcal meningitis
4. O’nyong-nyong
5. Something else
What is your diagnosis?
(choose one)

1. Dengue
2. Malaria
3. Meningococcal meningitis
4. O’nyong-nyong
5. Something else
Initial diagnosis & progress

• **Concern about meningococcal disease**
  - CT of head normal
  - Given ceftriaxone
  - No lumbar puncture
  - Transferred to Liverpool

• **Diagnosis presumed chikungunya**
  - Pulmonary embolus excluded by VQ scan

Clinical features

<table>
<thead>
<tr>
<th></th>
<th>Malaysia 1998 (%)</th>
<th>Réunion 2005-Feb 2006 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin rash</td>
<td>50</td>
<td>39</td>
</tr>
<tr>
<td>Myalgia</td>
<td>50</td>
<td>60</td>
</tr>
<tr>
<td>Headache, spinal pain</td>
<td>50, 50</td>
<td>70, NR</td>
</tr>
<tr>
<td>Arthralgia (all types)</td>
<td>78</td>
<td>100</td>
</tr>
<tr>
<td>Large joints</td>
<td>18</td>
<td>NR</td>
</tr>
<tr>
<td>Fever</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Number of reported cases</td>
<td>51</td>
<td>504</td>
</tr>
</tbody>
</table>

NR = not reported. Data for Malaysia from Lam and colleagues (2001)\(^9\) and data for Réunion from http://www.invs.sante.fr.

**Table**: Frequency of clinical manifestations during the 1998 Malaysian epidemic and the 2005 Réunion epidemic.
Fever & exanthems: differences

Clinical manifestations of chikungunya and dengue infections in returned travelers

<table>
<thead>
<tr>
<th>Clinical finding</th>
<th>Chikungunya (22 cases)</th>
<th>Dengue (16 cases)</th>
<th>Significance (P)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cephalalgia</td>
<td>9 (41)</td>
<td>11 (69)</td>
<td>0.087</td>
</tr>
<tr>
<td>Asthenia</td>
<td>15 (68)</td>
<td>13 (81)</td>
<td>NS</td>
</tr>
<tr>
<td>Myalgia</td>
<td>7 (32)</td>
<td>8 (50)</td>
<td>NS</td>
</tr>
<tr>
<td>Arthralgia</td>
<td>22 (100)</td>
<td>0</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Pruritus</td>
<td>10 (48)</td>
<td>5 (31)</td>
<td>NS</td>
</tr>
<tr>
<td>Lymphadenopathy</td>
<td>14 (64)</td>
<td>7 (44)</td>
<td>NS</td>
</tr>
<tr>
<td>Macular exanthema</td>
<td>16 (73)</td>
<td>13 (81)</td>
<td>NS</td>
</tr>
</tbody>
</table>

* NS, nonsignificant.
### Fever & exanthems: differences

<table>
<thead>
<tr>
<th>Biological finding</th>
<th>Chikungunya (22 cases)</th>
<th>Dengue (16 cases)</th>
<th>Significance (P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leucopenia</td>
<td>8 (40)</td>
<td>12 (75)</td>
<td>0.033</td>
</tr>
<tr>
<td>Neutropenia</td>
<td>2 (10)</td>
<td>13 (81)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Lymphopenia</td>
<td>18 (90)</td>
<td>9 (56)</td>
<td>0.049</td>
</tr>
<tr>
<td>Circulating lymphocytosis</td>
<td>6 (30)</td>
<td>5 (31)</td>
<td>NS</td>
</tr>
<tr>
<td>Anemia</td>
<td>3 (15)</td>
<td>0</td>
<td>NS</td>
</tr>
<tr>
<td>Thrombopenia</td>
<td>7 (35)</td>
<td>14 (88)</td>
<td>0.002</td>
</tr>
<tr>
<td>Increased ALAT*</td>
<td>13 (65)</td>
<td>14 (88)</td>
<td>NS</td>
</tr>
<tr>
<td>Increased CRP†</td>
<td>9 (64)</td>
<td>10 (77)</td>
<td>NS</td>
</tr>
</tbody>
</table>

* ALAT, alanine aminotransferase.
† CRP, C-reactive protein.

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Which of these is not a vector for chikungunya? (choose one)

1. *Aedes aegypti*
2. *Aedes albopictus*
3. *Aedes vittatus*
4. *Anopheles gambiae*
5. *Culex annulirostris*
Which of these is not a vector for chikungunya? (choose one)

1. Aedes aegypti
2. Aedes albopictus
3. Aedes vittatus
4. Anopheles gambiae
5. Culex annulorostris
**Figure 1:** Mosquito vectors of chikungunya virus

(A) Blood-gorged *A. albopictus* female feeding on a human host. *A. albopictus* is the primary chikungunya virus vector in the current Indian Ocean outbreak. (B) A *A. aegypti* mosquito. *A. aegypti* is the primary chikungunya virus vector in Asian chikungunya outbreaks. Images from United States Department of Agriculture.

How would you treat her?
(choose one)

1. Symptomatic treatment
2. Chloroquine
3. Interferon
4. Ribavirin
5. Aciclovir
How would you treat her?
(choose one)

1. Symptomatic treatment
2. Chloroquine
3. Interferon
4. Ribavirin
5. Aciclovir
Progress

6 weeks later
Severe fatigue
Mild joint pain
Sore leg wound – osteomyelitis excluded

3 months later
Improving
Compensated by travel health insurance

Serology
Positive IgM & IgG for Chikungunya
Epidemiology

- Tanzania 1953
- Asia
- West Africa
- Réunion, Mauritius etc from 2000
- 1.5M visitors in 2004
- UK importations >130 in 2006

*Figure 2: Chikungunya and dengue incidence in India and Indian Ocean.* Status as of March 17, 2006. Data from WHO, http://www.who.int.
Figure 3: Chikungunya cases in Réunion and imported cases into metropolitan France, April 2005–December 2006
Weekly notifications based on an estimated mathematical extrapolation (http://www.invs.sante.fr and reference 52) and imported cases in France.
India—Nasik district/Malegaon town
>2000 suspected chikungunya cases

India—Orissa state
4904 suspected cases

India—Andra Pradesh state
5761 suspected chikungunya cases

Maldives
602 suspected dengue cases

Seychelles
6099 suspected chikungunya cases

Mayotte

Legend:
- Country with occurrence of dengue and/or chikungunya
- Affected areas
- Country
The arrival, establishment and spread of exotic diseases: patterns and predictions

Sarah E. Randolph and David J. Rogers

Abstract | The impact of human activities on the principles and processes governing the arrival, establishment and spread of exotic pathogens is illustrated by vector-borne diseases such as malaria, dengue, chikungunya, West Nile, bluetongue and Crimean–Congo haemorrhagic fevers. Competent vectors, which are commonly already present in the areas, provide opportunities for infection by exotic pathogens that are introduced by travel and trade. At the same time, the correct combination of environmental conditions (both abiotic and biotic) makes many far-flung parts of the world latently and predictably, but differentially, permissive to persistent transmission cycles. Socioeconomic factors and nutritional status determine human exposure to disease and resistance to infection, respectively, so that disease incidence can vary independently of biological cycles.
Cos'è la chikungunya?
La febbre Chikungunya è una malattia nota per eventi epidemiici, il primo dei quali è stato registrato in Tanzania nel 1952. Da allora, sono stati descritti focali epidemicici in Asia ed Africa.
La Chikungunya è una malattia virale acuta, caratterizzata da sintomi simili-influenzali quali: febbre elevata, cefalea, debolezza, dolori articolari diffusi, che talora costringono il paziente ad assumere una posizione piegata nel tentativo di alleviare il dolore causato dall'inflammazione delle articolazioni, (in swahili, "Chikungunya" significa "che contorce"); tale quadro è accompagnato, in un'elevata percentuale di casi, da manifestazioni cutanee maculopapulari pruriginose, che talora possono assumere caratteristiche di tipo emorragico benigno (petecchie, ecchimosi, epistassi, gengivorragie).
I sintomi durano tre-cinque giorni e si risolvono spontaneamente, ma i dolori articolari, accompagnati da astenia, possono persistere anche per mesi. Le complicanze più gravi sono rappresentate dalla meningoencefalite e dallo shock settico da coagulazione vasale disseminata.
La Chikungunya è generalmente a decorso benigno, ma può essere fatale, particolarmente in soggetti anziani con sottostanti patologie di base (pazienti oncologici, trapiantati, pazienti affetti da malattie croniche quali broncopenmonopatia cronica ostruttiva, cardiopatie, diabete).

Come si trasmette?
Il virus responsabile della Chikungunya è un togavirus (arborvirus) che viene trasmesso dalle zanzare del genere Aedes, come Aedes aegypti e Aedes albopictus, comunemente chiamata zanzara tigre. Queste zanzare possono trasmettere l'infezione punendo una persona malata, nella fase acuta. La zanzara si infetta e successivamente punendo un'altra persona può trasmettere il virus. Il virus non si trasmette invece da persona a persona con i normali contatti di vita quotidiana.

Dopo quanto compaiono i sintomi?
Chikungunya - Italy September 2007

- 197 cases reported (Ravenna Province)
- 1-95 yr old; 52% female;
- 36 laboratory confirmed
- 31 being investigated
- 11 cases required hospital admission (incl. 83yr old man - multiple morbid chronic disease who died)

Index case
- Foreigner arrived Italy June 21 2007
- Travel history - Indian sub Continent
- Developed symptoms 2-3 days later
- Castiglione di Cervia, Ravenna Province

C/o Graham Lloyd
HPA Porton
Points

• Differential diagnosis of fever and rash from tropics is wide
• Case of probable nosocomial chikungunya infection
• As part of current large epidemic
• More severe and prolonged sequelae than dengue, especially joint disease
• Aedes vectors spreading and climate change may exacerbate this