

EXOTIC Chikungunya fever

Fact sheet

Introductory statement

Chikungunya fever is a viral, mosquito-borne disease of humans. The disease has been recognised throughout much of the world, with large outbreaks becoming more frequent in many endemic regions and the virus spreading recently to non-endemic areas. It is currently non-endemic in Australia, however annual cases (acquired overseas) appear to be increasing. The necessary mosquito vectors are present in areas of Australia. The role that wild or feral animals might play in the possible establishment and spread of chikungunya in Australia is not known.

Aetiology

The chikungunya virus is an alphavirus in the family *Togaviridae*. It is a single strand, heat-sensitive RNA virus (Powers and Logue 2007).

Natural hosts

The chikungunya virus circulates primarily through a sylvatic cycle between forest dwelling mosquitoes and non-human primates such as vervet monkeys (*Cercopithecus aethiops*), Guinea baboons (*Papio papio*), patas monkeys (*Erythrocebus patas*) and crab-eating macaques (*Macaca fascicularis*). At times this cycle spills over into the human population where it may be maintained by mosquitoes transferring virus from viraemic humans to available non-immune hosts. The virus has also been found to cycle through a range of other species including bushbabies (*Galago senegalensis*), striped ground squirrels (*Xerus erythropus*), yellow bats (*Scotophilus* sp.) and birds all of which may potentially contribute to human outbreaks (Diallo et al. 1999; Viennet et al. 2013).

It has been proposed that cattle could act as a reservoir for the virus. However, a study in the Central African Republic found only one serologically positive individual out of 183 Zebu cattle tested (Guilherme et al. 1996).

World distribution

Chikungunya virus is endemic in Africa, India, south-east Asia and the western Pacific, and appeared in Italy and France in 2007 and some Caribbean islands in 2013. Since 2004 there has been a major epidemic throughout the Indian Ocean region.

Occurrences in Australia

Only imported cases have occurred in humans in Australia. Between 2002 and 2012 168 human cases were imported into Australia mainly from Indonesia, India and Malaysia. Reported cases jumped dramatically to 127 in 2013 compared with 19 in 2012 (Viennet et al. 2013).

Epidemiology

The virus is most commonly transmitted by the Dengue mosquito (*Aedes aegypti*) and by the Asian tiger mosquito (*Aedes albopictus*). In Australia *Aedes aegypti* only occurs in north Queensland while *Aedes albopictus* only exists on Torres Strait islands (Viennet et al. 2013). However, a Promed article posted in February 2014 reported finding both mosquito species in insect traps in Darwin harbour (Promed 2014). Other Australian mosquito species could potentially act as competent vectors for this virus but they are not closely associated with human habitation (van den Hurk et al. 2010).

The incubation period of the disease in humans ranges from two to 12 days but is usually three to seven days. Asymptomatic infections occur in 3-25% of cases (Staples et al. 2009).

The transmission cycle of chikungunya virus is characterized by a periodicity of three to four years. These cycles, which characterize the movement of the virus in monkeys, are probably related to the immune status of the monkeys and to the percentage of the simian population susceptible to infection. Following the circulation of the virus, nearly all monkeys might be exposed to it and therefore become immunologically protected. The natural renewal of monkey populations by birth and migration leads to an increase in the proportion of non-immunized monkeys. The beginning of an epizootic will then depend on the population density of susceptible monkeys (Diallo et al. 1999).

Clinical signs

Symptoms of chikungunya virus infection in humans include fever, severe joint pain and swelling, headache, fatigue and muscle pain. A rash may also appear two to five days after infection and last up to 10 days. Most people infected with chikungunya virus recover completely in a few weeks. Some patients have prolonged fatigue lasting many weeks or joint pain or arthritis which may last for months. Occasionally, more severe complications can occur, however, fatalities are rare (Powers and Logue 2007).

Diagnosis and treatment

Diagnosis in humans is based on clinical signs, history and laboratory testing (serology, PCR or viral culture). Differential diagnoses in humans include diseases caused by other alphaviruses such as Ross River Virus (RRV), Barmah Forest Virus (BFV) and dengue fever. In humans, acute and convalescent serum samples should be collected at least three weeks apart (Staples et al. 2009). PCR or viral culture can be used to detect the

presence of viral RNA in serum (Staples et al. 2009). ELISAs can also be used to detect a rise in antibody titre (Viennet et al. 2013).

There is no vaccine or specific antiviral treatment currently available for chikungunya fever in humans. Treatment for humans is symptomatic.

A range of serological tests have been used to detect antibody response to Chikungunya infection in animals (Peiris et al. 1993; Guilherme et al. 1996; Diallo et al. 1999; Inoue et al. 2003; Kading et al. 2013; Nakgoi et al. 2014).

Prevention and control

The best way to prevent chikungunya virus infection in humans is to avoid mosquito bites. Infected persons should avoid further mosquito exposure so they can not contribute to the transmission cycle.

Surveillance and management

Chikungunya is notifiable in all Australian states and territories except the Australian Capital Territory. It is not currently nationally notifiable but a national case definition was implemented in 2010 and Australia's National Notifiable Diseases Surveillance System (NNDSS) includes a separate disease category for chikungunya (<http://www.health.gov.au/internet/main/publishing.nsf/Content/arbovirus+and+malaria+surveillance-2>) (Viennet et al. 2013).

For the latest information on outbreaks of chikungunya fever, including updates on the latest Caribbean epidemic (over 1400 cases as of February 2014) consult <http://www.promedmail.org>.

Statistics

Surveys of wild animals in Asia and Africa have shown serological evidence of chikungunya virus infection in a range of non human primates and other species.

In addition to the species listed earlier crab-eating macaques (Philippines), northern pig-tailed macaques (*Macaca nemestrina*) (Thailand), African elephants (*Loxodonta africana*) from the Congo basin, African forest buffalo (*Syncerus caffer*) in the Democratic Republic of Congo (DRC) and mandrills (*Mandrillus sphinx*) in Gabon have all tested serologically positive to chikungunya virus (Inoue et al. 2003; Kading et al. 2013; Nakgoi et al. 2014). All mountain gorillas (*Gorilla beringei beringei*) and chimpanzees (*Pan troglodytes*) that were tested were negative (Kading et al. 2013). There were no positives recorded from 40 duikers of various species that were tested in the DRC. Orangutans (*Pongo pygmaeus*) tested in Borneo and toque macaques (*Macaca sinica*) tested in Sri Lanka were negative (Peiris et al. 1993; Wolfe et al. 2001).

Research

Research is required to develop specific models incorporating ecological, entomological and virological factors to help predict future outbreaks. Further improvement in diagnostic testing is necessary for early detection and effective vector control and management. Research is also needed into the development of possible therapeutics and an effective vaccine (Staples et al. 2009).

Conclusions

The Australian human population has been stated as being at increasing risk from chikungunya virus. Arrivals from endemic countries have increased concurrently with vector incursions via imported goods, as well as via local movement from the Torres Strait to north Queensland. An outbreak of chikungunya fever could have a significant impact on health, the safety of blood products and tourism (Viennet et al. 2013). The role of wildlife in Australia in the potential establishment and spread of chikungunya in Australia needs to be clarified.

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To provide feedback on this fact sheet

We are interested in hearing from anyone with information on this condition in Australia, including laboratory reports, historical datasets or survey results that could be added to the National Wildlife Health Information System. Negative data are also valuable. If you can help, please contact us at admin@wildlifehealthaustralia.com.au.

Wildlife Health Australia would be very grateful for any feedback on this fact sheet. Please provide detailed comments or suggestions to admin@wildlifehealthaustralia.com.au. We would also like to hear from you if you have a particular area of expertise and would like to produce a fact sheet (or sheets) for the network (or update current sheets). A small amount of funding is available to facilitate this.

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Acknowledgements

We are extremely grateful to those who had input into this fact sheet and would specifically like to thank Peter Holz who produced this first draft.

Updated: 29 September 2015



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