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## **The First Imported Case of Chikungunya Fever in Taiwan**

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On 23rd of November 2006, the Centers for Disease Control (CDC) confirmed the first imported case of Chikungunya fever in Taiwan. The case was studying in Singapore at the time and hyperthermia was detected by infrared thermometer when the case entered Taiwan through Taiwan Taoyuan International Airport on 20<sup>th</sup> of November. Blood samples taken by CDC for polymerase chain reaction (PCR)

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on the 23<sup>rd</sup> of November were positive and Chikungunya fever was confirmed. Since Chikungunya fever was endemic in islands of Indian ocean and countries of southeastern Asia in 2006, CDC started to monitor disease-transmitting mosquitoes and fever cases entering through Taiwan Taoyuan International Airport. Dengue fever and Chikungunya fever are both transmitted by *Aedes* species and shared many common risk factors. Hence, it carries a risk for outbreaks to occur in Taiwan by these imported viruses. People should therefore have proper self-protecting measures to avoid mosquito bites when entering areas where Chikungunya fever are endemic, such as southeastern Asia and Africa, in order to reduce the risk of infection.

On 23<sup>rd</sup> of November 2006, CDC confirmed the first imported case of Chikungunya fever in Taiwan. The case was a 13 years old student who has studied abroad in Singapore since 2005. The case was in Shanghai during July and August of 2006 to visit parents who were doing business there, and then came back to Singapore to continue study. Apart from the Shanghai trip, the activity areas for the case were confined to the host family, school, supermarket, and library. It was never away from Singapore. Fever started on the 19<sup>th</sup> of November 2006 in Singapore and hyperthermia was detected by infrared sensor while entering Taiwan Taoyuan International Airport. Health assessment and questionnaires were done by disease surveillance personnel. In addition to fever, the case also complained of thirsty, weakness, and mild dyspnea. Blood samples were also taken. On 22<sup>nd</sup> of November, the case had generalized arthralgia. On 25<sup>th</sup> of November, fever subsided but maculopapular rash started to appear on the lower limbs which disappeared after 3 days. Blood specimens examined by CDC using PCR on 23<sup>rd</sup> of November were positive for Chikungunya fever. With the history of the case being in Singapore without going abroad, the infection source was suspected to be from Singapore.

Chikungunya fever is caused by the Chikungunya virus which is distributed in Africa, southeastern Asia and India. The virus was first isolated from the serum sample of a fever patient in Tanzania in 1952 [1]. It is transmitted by human-mosquito-human route, which is similar to Dengue fever and yellow fever [2].

The incubation period for Chikungunya fever is about 2 to 4 days. The characteristic symptoms are sudden onset of fever, headache, malaise, arthralgia or arthritis, myalgia, and low back pain. Maculopapular rash occurs in around half of the patients. The symptoms would continue for 3 to 7 days. Most patients recover well. Around 70% of patients would suffer from severe arthralgia from the onset of the disease which lasts from weeks to even months [2, 3]. In the early stage of the disease, symptoms of Chikungunya fever present similarly to malaria and dengue fever. It is very difficult to differentiate dengue fever and Chikungunya fever clinically, especially when no arthralgia could be identified [4].

Islands in the Indian Ocean had endemics of Chikungunya fever between May 2004 and May 2006. Around 300 thousands of cases were reported. In Reunion Island with population of 770 thousands people, there were 265 thousands (incident rate of 34%) of clinical cases with 237 cases among them died [5]. Other areas affected included Kenya, Comoros, Madagascar, Mauritius, Mayotte, and Seychelles. In addition, since early 2006, Andhra Pradesh, Karnatak, and Maharashtra provinces in India had 180 thousands of suspected cases [6-8]. Imported cases were also identified in French, Czech, Germany, England, Belgium, Norway, America and Hong Kong [2, 9-12]. On 24<sup>th</sup> of January 2007, an imported case was also identified in Japan, and the source of infection was from Sri Lanka.

Since the endemic in islands of the Indian ocean and countries of southeastern Asia was severe, CDC has decided to monitor disease-transmitting mosquitoes and also fever cases amongst travelers entering through international airports.

Apart from this first imported case of Chikungunya fever, there were only 3 cases of Chikungunya fever reported in 2006 in Taiwan. However, test results were all negative. The first case was a 15 years old female, a high school student. She traveled to India with a tour, entered Taiwan on 10<sup>th</sup> of August with symptoms started on the 18<sup>th</sup>, and notified by the hospital on the 25<sup>th</sup>. The final diagnosis was dengue fever, with the source of infection being India. The second case was an 8 years old girl, and elementary school student. She traveled to Indonesia during 5<sup>th</sup> to 20<sup>th</sup> of August. The onset of symptoms started on 22<sup>nd</sup> of August, and was reported by the hospital on the 28<sup>th</sup>. In addition to Chikungunya fever, the doctor also reported dengue fever. The diagnosis was later confirmed to be dengue fever, and the infection source was Indonesia. The third case was a 25-year-old male who traveled to India between 6<sup>th</sup> of August and 14<sup>th</sup> of September. The symptoms of fever, nausea, vomiting, and diarrhea occurred on 12<sup>th</sup> of September. Chikungunya fever and dengue fever were reported by hospital on the 28<sup>th</sup>, and the test results were all negative.

India had severe Chikungunya fever endemics in 2006. The results of antibody analyses and viral isolation suggested that the genotype prevalent between 1963 and 1973 was of Asia type and the genotype prevalent between 2000 and 2006 was of Africa type [13]. Since it has been 32 years without any reported cases of Chikungunya fever in India, the endemic in 2006 was suspected to be caused by imported viruses. Port Klang in Malaysia had an outbreak of more than 51 cases in 1998. It has been 7 years without cases of Chikungunya

fever before the outbreak in Bagan Panchor in 2006. Analyses of the sequences of viruses isolated in 2006 showed that the sequences were very similar to viruses isolated in 1998, suggesting that the outbreak in Malaysia had no relationship with islands in the Indian Ocean. It was suspected that Chikungunya fever had become a local disease of Malaysia [14]. Recently, the activity of Chikungunya virus is indeed increasing in southeastern Asia [15].

In Reunion Island and other islands in the Indian Ocean, *A. albopictus* might be the transmitting vector of Chikungunya virus [16]. However, in Kenya, Comoros and Asia, *A. aegypti* is the major vector [5, 11, 17]. In Asia, human is the only amplifying host of Chikungunya virus. Humans infected with Chikungunya virus would have high titers of virus between day 2 and day 6, and the viral loads are sufficient to transmit the disease to other people via mosquitoes [3].

Dengue and Chikungunya fever are both transmitted by *Aedes* species and shared many common risk factors. *A. albopictus* are scattered around Taiwan, and *A. aegypti* are scattered mainly south to Budai, Chia-Yi and north to Heng-Tsuen. The risk for local endemic exists if people were infected by Chikungunya virus overseas and returned to Taiwan during its peak viral load period.

Burke et al. conducted a survey during 1980 to 1981 towards 1,757 students between age 4 to 16 in Bangkok, Thailand, showing that 50% of students had been infected by Dengue fever, and 103 students had Dengue fever during the investigation period. The majority (90/103, 87%) of cases was asymptomatic or minimally symptomatic [18]. Around 35.7% of people infected with Chikungunya fever were asymptomatic [19]. Nimmannitya et al. compared symptoms from 32 patients of Chikungunya fever and 132 patients of Dengue

fever between 1962 and 1964, and found that there were no statistically significant difference in symptoms such as throat redness, headache, vomiting, rash, conjunctival injection, constipation, myalgia/arthralgia, restlessness, abdominal pain, generalized lymphadenopathy, cough, diarrhea, eruption, rhinitis, abnormal reflexes, and coma, except that rash, arthralgia and conjunctival injection were of lower rate in patients with Dengue fever[20]. Due to the difficulty of distinguishing between Chikungunya fever and Dengue fever, it is often easy to miss the diagnosis of Chikungunya fever.

Watanaveeradej et al. conducted a study to investigate whether antibodies against Chikungunya fever could penetrate the placenta. During the period of March 1998 to October 1999, serum samples of pregnant women were collected in Phramongkutklo Hospital in Thailand. The results showed that the ratio of people infected by Dengue virus and Chikungunya virus was 2.9:1. As a result, together with the fact that there were 130,000 cases of dengue fever in 1998, it was therefore estimated that 44,000 cases of Chikungunya fever should occur in Thailand that year [19]. However, there was no outbreak reported for Chikungunya fever in 1998. Hence, Chikungunya fever might be more prevalent than we expected. In areas endemic of Dengue fever, Chikungunya fever might also be prevalent [19]. To prevent Chikungunya fever, disease surveillance and monitoring of disease-transmitting mosquitoes, together with other public health policies should be intervened. So far there is no vaccine or specific therapy against Chikungunya fever. People going to southeastern Asia and Africa should have proper self-protecting measures to prevent mosquito bites in exposed areas of the body to minimize the risk of infection.

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