



The Dengue Update



A CDC Update on a Critical Disease Threat

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CDC's Dengue Branch in Puerto Rico is the largest single dengue research and response unit in the world.

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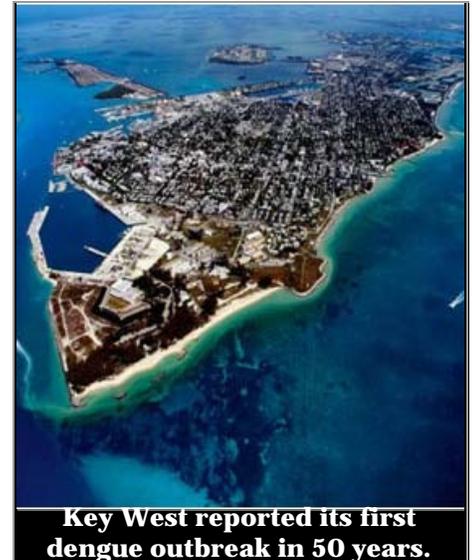
Dengue in Key West, Florida

If any place in the U.S. was ripe for a re-emergence of dengue virus, it was Florida. All the necessary factors for disease transmission were present: an abundance of a competent mosquito vector, *Aedes aegypti*; frequent opportunities for viral introduction by international travelers; a susceptible population; and a climate that lends itself to frequent human-mosquito contact. These fears were realized in September 2009, when three cases of locally acquired dengue were detected in Old Town Key West within a 2-week period (visit [Locally Acquired Dengue --- Key West, Florida, 2009--2010](#)). These were the first cases discovered in Florida since 1934. The Monroe County Health Department, Florida Department of Health, the Florida Keys Mosquito Control District and CDC's Dengue Branch launched an investigation to determine the extent of the outbreak, how it started, factors associated with dengue infection and how the outbreak could be stopped.

The investigation had four elements: 1) Blood samples were taken from volunteers in randomly selected households (a "serosurvey") within a 1 km radius of the index cases; 2) Medical charts were reviewed of patients who did seek medical care and who had symptoms consistent with dengue; 3) Key West residents, physicians and hospitals were enlisted in a surveillance program to identify new cases; and 4) Mosquitoes were tested for dengue virus.

Of 240 randomly selected serosurvey participants, 13 had evidence of dengue infection between July and September 2009. This indicates that an estimated 5% of the Key West population--over 1,000 people--had been infected, but does not account for possible dengue infections among the over 2 million visitors to Key West in 2009. An additional 14 cases of laboratory-confirmed dengue, contracted between July and October, 2009, were uncovered during the hospital record review and prospective surveillance for new cases, including 3 cases in the Keys but outside of Old Town. And some mosquitoes collected in Key West during October tested positive for a dengue virus strain was almost identical to one previously isolated in Mexico. Despite continued monitoring, no further evidence of dengue was identified in either humans or mosquitoes from November 2009 to March 2010. The Monroe County Health Department and Florida Keys Mosquito Control District launched a comprehensive public education and mosquito control campaign that ran throughout the winter. But in early April 2010, a Key West resident with no history of recent travel was hospitalized with laboratory-confirmed dengue hemorrhagic fever. It is unknown at this time whether this represents a continuation of the 2009 epidemic or is the result of a new introduction of the virus. The investigation continues.

Dengue was once epidemic in the U.S. as far north as Philadelphia and its re-emergence is cause for serious concern, especially if the most recent case indicates transmission is continuing after a model response. Not only Florida but much of the Gulf Coast, where the vector mosquito *Aedes aegypti* is established, is



potentially at risk. This outbreak reminds us of the need for increased public health vigilance and for better tools to effectively respond. Visit [Florida Arbovirus Surveillance](#) for up-to-date dengue activity recorded in Florida. As of July 3, 2010 there have been 12 locally-acquired cases associated with Key West (Monroe County).

New Dengue Branch Chief: Harold S. (Hal) Margolis, MD



**Harold S.
Margolis,
MD
Dengue
Branch
Chief**

Hal Margolis, MD, joins the Dengue Branch in San Juan, Puerto Rico with a wealth of experience in public health and dengue, most recently as Director of the Pediatric Dengue Vaccine Initiative (PDVI), a program of the International Vaccine Institute. Dr. Margolis has had a long prior association with CDC, beginning as an officer of the Epidemic Investigation Service (EIS), stationed at the Arctic Investigations Program in Anchorage, and ending as Director of the Division of Viral Hepatitis, where he was instrumental in the worldwide introduction of the hepatitis B vaccine. He is a board-certified pediatrician, a fellow of the American Academy of Pediatrics, and a fellow of the Infectious Disease Society of America.

His research and public health interests have focused on evaluation and introduction of new vaccines, molecular epidemiology of hepatitis viruses, and development of evidence-based public health policy. Dr. Margolis is the author or co-author of 180 peer reviewed publications, including 35 book chapters or proceedings. We enthusiastically welcome Hal back to CDC and look forward to his leadership in the battle against dengue.

CDC's Dengue Branch

Some diseases in the United States, as in other countries, must be reported by physicians and hospitals to public health authorities as a means of establishing the baseline occurrence of the disease or condition. In this way any increase above baseline will promptly trigger a public health response. This is especially important with infectious diseases because it allows authorities to alert the community of an increased health risk and to take action to protect the public. In the U.S., CDC is responsible for collecting and analyzing these data. Before June 2009, dengue was not a reportable disease in the U.S. On the recommendation of the Council of State and Territorial Epidemiologists (CSTE), dengue viral infections, including dengue fever and dengue hemorrhagic fever, became reportable in January 2010.



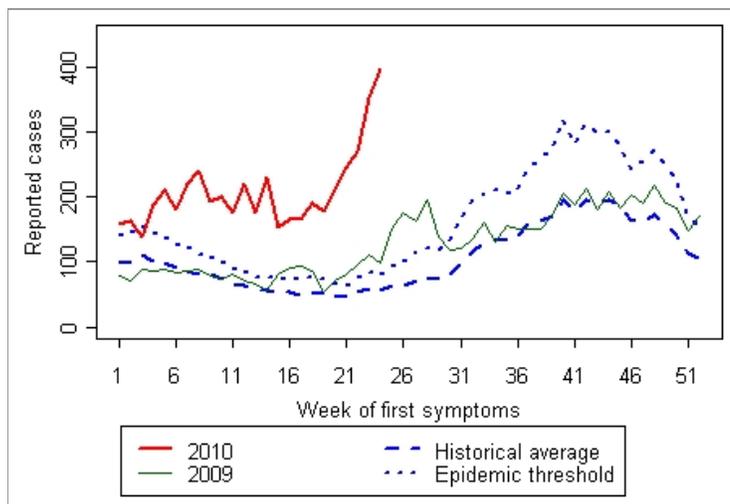
In 2007, there were more than 10,500 cases of dengue reported among Americans residing in the continental United States and its territories. Many of these cases occurred among the 4 million U.S. citizens that reside in Puerto Rico, the U.S. Virgin Islands, and U.S. territories in the Pacific. However, there were several cases among travelers returning to the continental U.S. from dengue endemic countries in the Caribbean, Mexico, Central and South America, and Asia and the Pacific. Clearly, dengue poses an increasing risk to public health in the United States.

Dengue was once common in the southern and eastern U.S., but few cases had occurred in the continental U.S. for over 50 years until recently (see article on Key West). Infection with any of the four dengue virus serotypes can cause disease which can range from days or weeks of pain and discomfort to severe and life-threatening conditions. Unlike most other mosquito-borne viruses, humans are key in the transmission cycle for dengue virus - that is, if the right type of mosquito bites a person with dengue virus in their blood, the mosquito can acquire enough virus to transmit dengue to another person, after a short incubation period. Returning dengue-infected travelers, therefore, can introduce a risk of local dengue transmission to areas of the U.S. where one of the mosquito vectors for dengue (*Aedes aegypti* or *Aedes albopictus*) are present. With dengue as a reportable disease, there are now increased opportunities to investigate cases, to detect outbreaks earlier, and to have statistics that more accurately reflect reality.

CSTE, representing each state and territorial jurisdiction in the country, determines the list of reportable diseases. They balance the resources demanded by reporting diseases against the potential public health benefit, and revise the list of reportable diseases periodically. Health care providers can refer to CDC's dengue website (www.cdc.gov/dengue) for complete information on properly diagnosing and reporting dengue cases, including information on diagnostic sample submission. CDC laboratories in San Juan, Puerto Rico and Fort Collins, Colorado offer free diagnostic testing for specimens submitted by state, county, or city health departments.

CDC encourages providers to report all confirmed and presumptive cases of dengue to their local or State Health Department who will report them to ArboNET, a national electronic passive surveillance system for arboviral diseases. Dengue fever (DF) and dengue hemorrhagic fever (DHF), including the most severe form of DHF, dengue shock syndrome, are now reported on a weekly basis to the Morbidity and Mortality Weekly Report (MMWR) via the ArboNET surveillance system. Ultimately, adding dengue to the nationally reportable disease list allows state and CDC authorities to systematically review collected data to identify trends in disease importation. As a result, local communities can focus their attention on prevention, while local health care providers can be more vigilant in looking for the potential of dengue in their patients.

Early trends indicates epidemic potential in Puerto Rico



Early season dengue cases predict massive outbreak in

of cases reported so far this year. As we move into the typically more active dengue season beginning in July, CDC's Dengue Branch is collaborating with the Puerto Rico Health Department to increase clinician education efforts, implement early warning strategies and prepare for increased demand for diagnostic testing. The situation in Puerto Rico will continue to be updated weekly .

Early season suspected dengue cases for 2010 in Puerto Rico continue to be recorded at a level not seen since the massive dengue epidemic that affected the territory in 1998. The red line in the graph indicates how markedly this year's activity diverges from the historical average and above the epidemic threshold. Similar to 1997-98, a strong El Niño event is occurring in early 2009-10 and is associated with increased temperatures in Puerto Rico. Increased temperatures are likely to contribute to increased transmission but are not sufficient alone to account for the unexpectedly high number