DENGUE FEVER
(Breakbone Fever, Dandy Fever)

REPORTING INFORMATION
- Class A(2)
- Report by the end of the next business day
- Ohio Disease Reporting System (ODRS), lab report (3833.11) or telephone

AGENT
Dengue viruses 1,2,3 and 4: flaviviruses. There is substantial serologic cross-reaction with other flaviviruses, (e.g., St. Louis encephalitis, Yellow Fever, Japanese B encephalitis).

Infectious Dose
One bite of an infectious mosquito is sufficient.

CASE DEFINITION
Clinical Description
An acute febrile illness characterized by frontal headache, retro-ocular pain, muscle and joint pain and rash. The principal vector is the *Aedes aegypti* mosquito and transmission usually occurs in tropical and subtropical areas. Severe manifestations (e.g., dengue hemorrhagic fever and dengue shock syndrome) are rare, but may be fatal.

Laboratory Criteria for Diagnosis
- Isolation of dengue virus from serum and/or autopsy tissue samples or
- Demonstration of a 4-fold or greater rise or fall in reciprocal immunoglobulin G (IgG) or immunoglobulin M (IgM) antibody titers to one or more dengue virus antigens in paired serum samples or
- Demonstration of dengue virus antigen in autopsy tissue or serum samples by immunohistochemistry or by viral nucleic acid detection

Case Classification
Probable: A clinically compatible illness with supportive serologic findings (a reciprocal IgG antibody titer of $\geq$1280 or a positive IgM antibody test on a single late acute- or convalescent-phase serum specimen to one or more dengue virus antigens).

Confirmed: A clinically compatible case that is laboratory confirmed.

Comments
Dengue hemorrhagic fever is defined as an acute febrile illness with minor or major bleeding phenomena, thrombocytopenia ($\leq$100,000/mm^3), and evidence of plasma leakage documented by hemoconcentration (hematocrit increased by $\geq$20%) or other objective evidence of increased capillary permeability. The definition of dengue shock syndrome follows all of the above criteria for dengue hemorrhagic fever and also includes hypotension or narrow pulse pressure ($\leq$20 mm Hg).

Another severe and fatal form of hemorrhagic dengue has also been described which does not meet the WHO case definition. These patients have severe hemorrhage, usually from the upper gastrointestinal tract. The development of shock appears to be secondary to blood loss rather than increased capillary permeability.

SIGNS AND SYMPTOMS
Sudden onset of chills, severe headache, backache, intense pain in joints, muscles, high fever (103-106°F), nausea and vomiting, facial edema and erythematous eruption (rash). Generally, younger children have a milder illness than older children and adults. Remission usually develops on day three, lasting 2-3 days. Fever and pains recur for about 1-2 days. Eruption recurs. Hemorrhagic symptoms are thought to result upon second encounter with a dengue virus of a different serotype.

DIAGNOSIS

The CDC in San Juan, Puerto Rico can perform ELISA-IgM and virus isolation on the acute serum. Proper protocol is to send the sample(s) to the CDC Dengue Laboratory via the ODH Laboratory (ODHL). Call ODHL, 1-888-ODH-LABS (888-634-5227) select option #2-Microbiology, to arrange for shipment of slides or other specimens to CDC.
A convalescent serum should be obtained two weeks later and also sent to CDC.

The diagnosis of dengue fever can be confirmed by isolating dengue virus from the acute blood sample, by demonstrating specific IgM antibody in appropriately timed serum sample(s) (obtained 5-60 days after onset of illness) or by demonstrating a 4-fold or greater change in IgG antibody titer to dengue virus in a serum pair. Individuals who have had one or more flavivirus infections, including yellow fever immunization, may produce heterologous antibodies to a wide range of flavivirus antigens. A specific dengue diagnosis can still be made, however, by virus isolation or inferred from epidemiologic associations.

EPIDEMIOLOGY

Source

Humans are the vertebrate reservoir, with monkeys possibly being involved.

Occurrence

Endemic in tropical Asia, East and West Africa, Polynesia, Micronesia and Tahiti. Dengue is also endemic in the Caribbean, northern South America and Central America. Dengue is periodically epidemic in the Western Hemisphere, with thousands of cases diagnosed. Travelers are always at risk when visiting endemic countries. About one or two imported cases are identified annually in Ohio.

Mode of Transmission

The virus is transmitted only by certain species of mosquitoes. *Aedes aegypti* is endemic to the southeastern Atlantic and Gulf Coast states in the United States. Two dengue vectors might occur in Ohio. *Aedes aegypti* probably cannot become established in Ohio due to severity of winters. *Aedes albopictus*, the Asian vector of dengue, has recently become established in Ohio. Since 1987, it has been found in 28 counties in Ohio. The spread of *Aedes albopictus* is due primarily to commerce in used tires, in which it breeds.

Period of Communicability

Humans are infectious to biting *Aedes aegypti* or *Aedes albopictus* from the day prior to onset of symptoms to day five of illness. No human-to-human transmission occurs.

Incubation Period

3-15 days, usually 5-6 days.

PUBLIC HEALTH MANAGEMENT

Case

Investigation

A complete travel history for 15 days prior to onset for the patient must be obtained. Determine patient's yellow fever vaccine status.

Treatment

There is no specific medication for treatment of a dengue infection. Persons who think they have dengue should use analgesics (pain relievers) with acetaminophen and avoid those containing aspirin. They should also rest, drink plenty of fluids, and consult a physician.

Isolation

No specific isolation procedures are indicated for the acute dengue patient in Ohio.

Follow-up Specimens
If a convalescent serum sample was not obtained, a late convalescent sample should be obtained. Autopsy blood and/or tissue samples may also be taken. Proper protocol is to send the sample(s) to the CDC Dengue Laboratory via the ODHL (See **DIAGNOSIS**, above).

Public Health Significance
High in endemic areas.

Special Information
There is a low probability of endemic transmission occurring in Ohio because of the low prevalence of the vector mosquito.

Contact
No prophylaxis is indicated. There is no vaccine available.

Prevention and Control
Follow-up Specimens
Does not apply if Dengue has been laboratory confirmed.

Travelers
Travelers entering endemic areas should be warned to avoid mosquitoes, use mosquito repellants, occupy screened quarters and use mosquito netting over beds.

Vaccination
There is no vaccine available.

Vector Investigation
A survey should be performed by the local health department to determine if *Aedes aegypti* or *Aedes albopictus* are present near the patient's home or travel sites in Ohio. For advice on vector assessment, contact the Zoonotic Disease Program at 614 752-1029 and select option #2 or via the ODH website www.odh.ohio.gov.

SPECIAL INFORMATION
Accurate travel history and confirmation are desirable to document importation of dengue infections from endemic areas into the United States. Note if travelers had spent any time in the southeastern Atlantic or Gulf Coastal states, where *Aedes aegypti* or *Aedes albopictus* is endemic, before returning to Ohio. The CDC Dengue Branch may be contacted at 787 766-5181 for special consultation.

What is dengue fever?
Dengue fever is also known as break-bone fever or dandy fever. It is caused by one of four very similar viruses.

Each year, millions of cases of dengue fever occur worldwide. It is commonly found in the tropical and sub-tropical environments of Asia, East and West Africa, Polynesia, Micronesia and Tahiti. It may also be found in the Caribbean, northern South America and Central America.

Although there are two types of mosquitoes capable of transmitting dengue fever found in some Ohio counties, the virus is not endemic in the state. A few (two to three) human cases are reported in Ohio each year, but most had history of travel to infected areas.

How is dengue fever transmitted?
Dengue fever is transmitted through the bite of an infected mosquito, most often *Aedes aegypti*. No transmission occurs directly from person to person.

What are the symptoms of dengue fever?
Patients typically develop a high fever, headache, pain behind the eyes, painful joints and muscles, nausea, vomiting, and often a rash. These symptoms last about one week, but weakness and tiredness may persist for several weeks. Young, healthy people often have no symptoms.

Some patients with dengue fever go on to develop dengue hemorrhagic fever (DHF) a severe and sometimes fatal form of the disease. About the time the fever begins to subside, the patient may display problems with blood circulation. These can include abnormal bruising, blood in the urine or stool, bloody nose, and/or bleeding gums. If untreated these symptoms may lead to death.

How long after exposure before symptoms appear?
Symptoms typically develop within 3 to 15 days, usually in 5 or 6.

How is dengue fever diagnosed?
The virus can be isolated in a lab or a test for specific antibodies can be performed on blood or other tissues.

Can dengue fever be treated?
There is no cure for the virus, so treatment is aimed at treating the symptoms. Fluids to maintain hydration and medications to reduce fever and eliminate pain are often prescribed. Aspirin should be avoided because it can decrease the blood's ability to clot. Severe cases and those that progress to dengue hemorrhagic fever require hospitalization with intensive monitoring and treatment.

How can I prevent dengue fever?
Prevent mosquito bites especially when traveling to areas where dengue fever is common. It only takes one bite from an infected mosquito to transmit disease.

Avoid mosquito bites.

- Avoid wet, swampy areas where mosquitoes live and breed.
- Avoid activities during the peak mosquito biting activity of dawn, dusk and early evening.
- Install or repair window and door screens to keep mosquitoes outside.
- Use mosquito netting over infant carriers

Repel mosquitoes when outdoors.

- If the weather permits wear long pants, long sleeves, and/or socks.
- Apply mosquito repellant as directed to clothing and exposed skin.
- Reapply mosquito repellant as needed especially if swimming or sweating.

Eliminate mosquito breeding sites.

- At least once or twice a week, empty water from flower pots, pet food and water dishes, birdbaths, swimming pool covers, buckets, barrels, and cans.
- Check for clogged rain gutters and clean them out.
- Remove discarded tires, and other items that could collect water.
- Be sure to check for containers or trash in places that may be hard to see, such as under bushes or under your home.

For more information please visit these websites.
CDC dengue fever fact sheet http://www.cdc.gov/ncidod/dvbid/dengue/dengue-ga.htm

CDC dengue fever information for health care providers
http://www.cdc.gov/ncidod/dvbid/dengue/dengue-hcp.htm

CDC insect repellant use and safety
http://www.cdc.gov/ncidod/dvbid/westnile/qa/insect_repellent.htm