

Mosquito Borne Diseases

Mosquitoes are generally considered an annoyance but some species have the potential to transmit diseases in humans and animals. Mosquito borne diseases such as malaria, yellow fever, dengue fever, filariasis and others occur worldwide, but presently remain relatively rare in the United States. For example, about 500 million cases of malaria with about 2 million deaths occur annually, but only about a thousand cases were reported in this country (in 1988). Most U.S. malaria cases (about 99%) were acquired in other countries. Yellow fever has been responsible for many epidemics with high mortality rates in many parts of the world including the United States. This disease has been greatly reduced worldwide and has not been present in this country for many years. Filariasis is a common human illness in many warm parts of the world, but, like malaria, it has not been significant in the United States for some time. Dengue fever (breakbone Fever) remains a concern in many parts of the world including Caribbean basin countries, South America and Mexico. Dengue is normally uncommon in the United States but, because of the proximity of the southern U.S. to countries where the disease is endemic, there is a concern among health officials that the disease could cause difficulty in the future. There have been some localized outbreaks of dengue in Texas and Hawaii.



Encephalitis diseases have many causative agents, some of which are transmitted by mosquitoes. In Florida, eastern equine encephalitis (EEE), St. Louis encephalitis (SLE) and the recently introduced west Nile virus (WN) are the leading forms of mosquito-transmitted encephalitis. Eastern equine encephalitis is the most virulent of these forms with a mortality rate in humans of 30 to 60 percent. The disease has been reported statewide but seems to be more common in the northern part of the state. Fortunately, this disease remains rather rare in humans with only a few human cases reported each year. There have been some larger outbreaks of St. Louis encephalitis in Florida (The last in 1990). The mortality rate for this disease is much lower than that of eastern equine encephalitis, only being 3 to 20 percent. West Nile virus was first reported in the New York City area in 1999 but has rapidly spread throughout the eastern United States. A few cases (12) were reported in Florida last year (2001) but it is difficult to determine how many people were infected because a large majority of the cases have very mild symptoms or no symptoms at all. What will happen with this disease in Florida is not known at this time.

In order for a disease to be transmitted by mosquitoes, certain conditions must be met; (1) the disease agent (the actual organism that causes illness, for example a virus) must be ingested by the vector (the organism which carries the disease), (2) the disease agent must be able to survive and reproduce inside the vector and finally (3), the disease agent must be injected into the new host (the individual who is sick from the disease). Most diseases such as influenza (flu) viruses, colds, and bacterial diseases cannot be transmitted by mosquitoes because the disease agent cannot survive and reproduce inside the mosquito. For example, if a mosquito bites a person with the flu, the flu virus is easily ingested by the mosquito but it cannot survive and reproduce inside the mosquito. In contrast, diseases such as dengue fever or west Nile virus are easily egested by a mosquito from the infected host. The virus is able to survive and reproduce within the mosquito and finally, the agent moves to the mosquitoes salivary glands where it can be injected into a new host, thus transmitting the

disease.

Not all species of mosquitoes are equally efficient at transmitting diseases. For example, yellow fever and dengue fever are transmitted primarily by the Yellow Fever Mosquito (*Aedes aegypti*) and malaria is vectored only by some mosquitoes of the genus *Anopheles*. The Asian Tiger Mosquito (*Aedes albopictus*) has been implicated as a vector of dengue in some parts of the world. Mosquitoes of the genus *Culex* are the major suspects for both St. Louis encephalitis and west Nile virus. The transmission mechanism for eastern equine encephalitis is poorly understood. It must be remembered that without the disease agent, a mosquito cannot transmit a disease. Yellow Fever Mosquitoes, Tiger Mosquitoes and *Anopheles* Mosquitoes are very common in this area, but, since the disease agents that they can transmit are not present, there are no illnesses from their bites. The mosquito borne encephalitis diseases that are found in Florida (EEE, SLE and WN) generally show up first in birds or veterinary cases (mainly horses). Because of this, most mosquito control districts monitor sentinel chicken flocks and horses to detect if the disease becomes a significant threat in a given area.