

## **Arboviral Infection**

**Agent(s):** In Virginia, the agents of arboviral infection, from most to least common, are the mosquito-borne West Nile virus (WNV), La Crosse encephalitis (LAC) virus, St. Louis encephalitis (SLE) virus and Eastern equine encephalitis (EEE) virus. Other arboviral agents causing illness in Virginians include the imported dengue virus and chikungunya virus, which typically infect travelers to endemic regions of the tropics and subtropics, but have not become established in Virginia. Powassan (POW) virus, which is a tick-borne encephalitis virus, was recently discovered in Virginia.

**Mode of Transmission:** Most commonly through the bite of an infected mosquito. WNV may also be transmitted by blood products via transfusion or transplanted organs from infected donors, and more rarely by cuts or punctures with contaminated scalpels or needles in a laboratory.

**Signs/Symptoms:** Severity of symptoms differs depending on the particular virus and characteristics of the infected person. Most infections are asymptomatic. Mild cases may appear as fever with headache. More severe disease can cause encephalitis (i.e., inflammation of the brain) or meningitis (i.e., inflammation of the lining of the brain and spinal cord) and may lead to permanent neurological impairment or death.

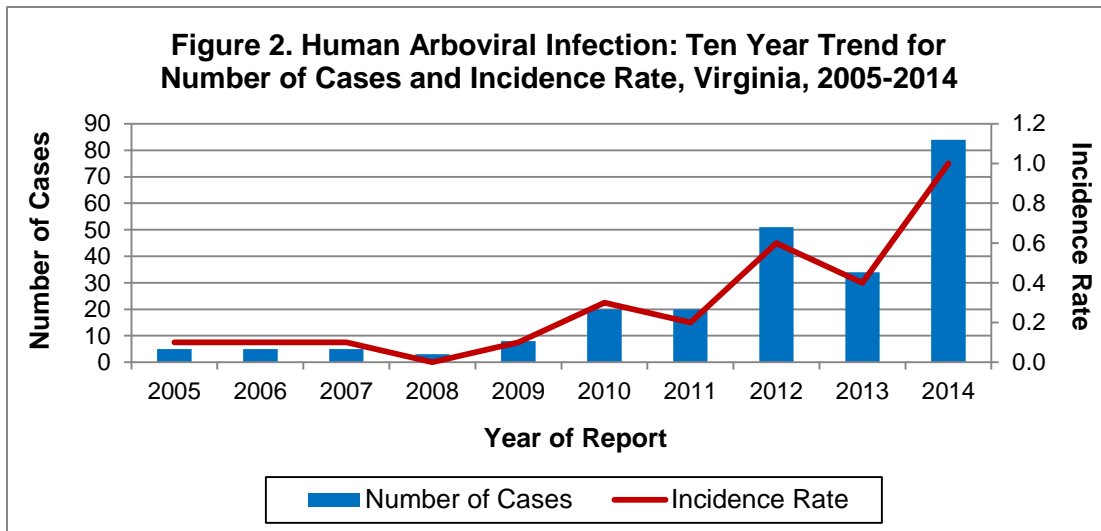
**Prevention:** Minimize bites by avoiding areas infested by mosquitoes or ticks, and, when in those areas, use mosquito or tick repellents and wear long-sleeved, light-colored clothing with pants legs tucked into socks. Additional mosquito control measures include maintaining screens on all open windows and doors and eliminating or regularly dumping all containers that could hold water and breed mosquitoes, including buckets, birdbaths and discarded tires. After visiting tick habitats, a person should thoroughly check all body surfaces for ticks and, if found, carefully remove attached ticks as soon as possible.

**Other Important Information:** WNV and SLE infections are more likely to cause severe disease in persons over the age of 50, but the majority of infections are asymptomatic. LAC is seen primarily in individuals less than 16 years of age. EEE has a high fatality rate and is more likely to affect children under the age of 15 and adults over the age of 50. The chikungunya virus was first seen in the Americas on the islands in the Caribbean in late 2013. The virus may be imported to new areas by infected travelers.

<b>Arboviral Infection: 2014 Data Summary</b>	
Number of Cases:	84
5-Year Average Number of Cases:	26.6
% Change from 5-Year Average:	+216%
Incidence Rate per 100,000:	1.0

### **Human**

In 2014, 84 cases of arboviral infection were reported in Virginia, which is significantly higher than the 5-year average of 26.6 cases per year and the 34 cases reported in 2013. Notably, the majority of the cases were acquired out-of-country with 75 (89%) of 84



cases being imported. Chikungunya accounted for 58 of the imported cases and dengue accounted for 17 of the imported cases. Nine infections were acquired in the U.S., including seven attributed to West Nile virus and two attributed to La Crosse encephalitis virus. Similar to 2013, no cases of Eastern equine encephalitis or Powassan virus were reported.

The sharp increase in arboviral cases in 2014 can be linked to the high number of imported chikungunya infections. The 58 cases were reported across all age groups except infants, with most cases (13) reported among the 30-39 year age group. More cases occurred among females (38 cases) than males (20 cases). One case was reported in a traveler from Asia (Indonesia) but all other cases were associated with travel to the Caribbean and Central and South America. The chikungunya cases associated with travel to the Americas resulted from the introduction and spread of the chikungunya virus beginning in 2013.

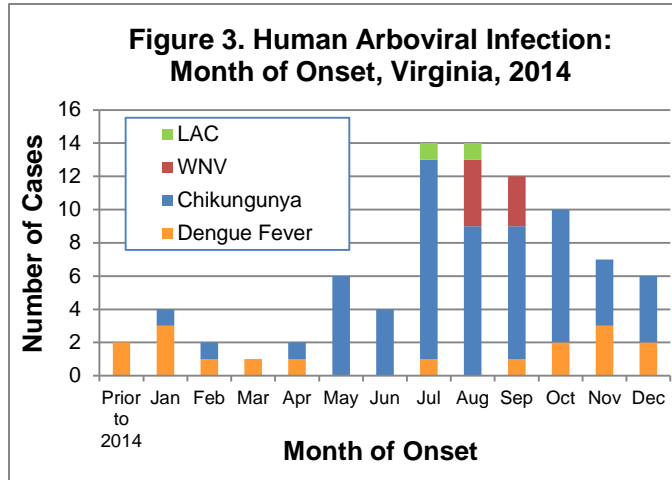
All 17 dengue cases were acquired by travelers returning from dengue endemic countries in the American tropics (Central America and Mexico) and south Asia. Dengue cases ranged in age from 16-66 years. Eight of 15 cases were female. There were no reported cases of dengue hemorrhagic fever.

In 2014, WNV activity was similar to the preceding year. Seven cases were reported in 2014 compared to six cases in 2013. The cases ranged in age from 28-63 years. Cases occurred in three regions of the state, with three cases each reported from the northern and eastern regions and one reported from the central region. All cases occurred among residents of urban areas. One fatality was attributed to WNV in 2014. This individual was also infected with La Crosse virus and the illnesses were counted in both the WNV and LAC categories (see below).

Two cases of La Crosse were reported in 2014. One case occurred in a school-aged child from the northwest region and the other case occurred in an elderly person from the

northern region. This person was co-infected with West Nile Virus and died as a result of the infections.

Cases of arboviral infection occurred throughout the year, but locally acquired arboviral infections (LAC and WNV) occurred only in July, August, and September. The two cases of LAC had onset in July and August, which is typical for this condition, while WNV was seen in August and September, the normal peak time of WNV transmission for Virginia. Onset dates for the imported cases of chikungunya were reported in every month except March, with most cases occurring from July through October. Cases of imported dengue were reported nearly year round, except May, June, and August. As these infections were acquired out of the country, any seasonality would be based on travel patterns and seasonality of the illness in the endemic countries of origin.



## Animal

Zoonotic surveillance for WNV and EEE is conducted each year by a limited number of jurisdictions in northern Virginia, the Richmond metropolitan area, and Hampton Roads. These surveillance programs test for the presence of arboviruses in mosquitoes and sentinel chickens. Sentinel chicken flocks are maintained only by surveillance programs in the Hampton Roads area. Veterinary records are also reviewed for cases of arboviral infection in equines and other animals statewide. No mosquito or zoonotic surveillance and testing programs are in place for LAC or SLE viruses.

In 2014, 446,969 mosquitoes were tested for WNV and 227,781 were tested for EEE. All mosquitoes were tested as “pools” (i.e., batches of approximately 50 mosquitoes). Of the 13,719 pools tested for WNV, 481 (4%) were positive, and of the 5,725 pools tested for EEE, 212 (4%) were positive. Among the positive pools, each was likely to have only contained one positive mosquito. Of the 481 WNV positive pools, 354 were collected in northern Virginia, 116 were collected in eastern Virginia, and 11 in central Virginia. All EEE positive pools were collected in eastern Virginia.

In 2014, three cases of WNV-infected horses were reported in the northern region and one EEE-infected horse in the eastern region. EEE infections were also reported in three cassowary birds held in captivity at a zoo in the eastern region. Testing of sentinel chickens revealed 31 WNV-positive chickens in the Chesapeake, Norfolk, and Suffolk area, and 40 EEE-positive chickens in the Chesapeake, Norfolk, Suffolk, and Virginia Beach area.