

DELAWARE MOSQUITO CONTROL SECTION

FAQ #10. What are human health problems/symptoms when a mosquito-borne viral disease is contracted? And what is the probability of my becoming infected or sick?

As mentioned in FAQ #2, the primary mosquito-borne disease concerns in Delaware for humans are now eastern equine encephalitis (EEE) and West Nile virus (WNV), with EEE being much more virulent than WNV, but fortunately also less common. Insects such as mosquitoes are part of a larger phylum of invertebrates called arthropods, and arthropod-borne viruses are known in general as arboviruses. Arboviral encephalitis such as EEE and WNV are viruses that in their worst manifestation cause **encephalitis**, which is a swelling of the brain having severe health consequences. [When the brain swelling is also associated with inflammation of the brain's outer lining and spinal cord, the condition becomes meningoencephalitis.]

A large majority of people infected with WNV apparently might never know they've been infected, in that they feel no adverse effects whatsoever (i.e. they're asymptomatic), or they have only mild overall discomfort that's not severe enough for them to seek any medical attention; however, this relatively benign reaction is rarely the case with EEE.

When symptoms are first felt for either WNV or EEE, early indications of infection include headache, mild fever, body aches, malaise, and occasional swollen lymph glands, all which are flu-like symptoms (as such, if you live in an area where mosquitoes are abundant, you might want to be somewhat suspicious if you or someone you know comes down with a "summer flu," and seek medical care). These early symptoms might occur from 7-10 days after receiving an infectious bite, and might come on slowly or quite suddenly. [The most probable time of year in Delaware to contract an arbovirus is during late summer and early fall, from about the last week in July through early October.] A more virulent infection for WNV or EEE can progress to severe headache, high fever, neck stiffness, and muscular weakness, and cause behavioral changes including stupor, confusion and disorientation. Patients with these more severe symptoms are often recognized as neuroinvasive cases, in that nervous system functions have become affected or impaired. Progressing to full-blown encephalitis, which fortunately is a rare occurrence, can then cause tremors, convulsions, coma and paralysis. Death occurs in about 5% of patients with full-blown WNV, with any fatalities most common in people >50 years old and those with impaired immune systems. Full-blown EEE is more fatal, with death occurring in up to 30% of young adult or middle-aged patients, and up to a 70% fatality rate in children or the elderly. For patients who do not die from full-blown encephalitis (whether caused by WNV or EEE), after-effects usually involve long-term or permanent neurological damage or sequelae, sometimes having debilitating consequences.

Since arboviral encephalitides are viral diseases, trying to use antibiotics to treat WNV or EEE is not effective, and no effective antiviral drugs have yet been discovered. For full-blown encephalitis, the best that physicians can do is try to treat the symptoms and problems associated with brain swelling, deal with associated complications where treatable (e.g. bacterial pneumonia), and hope for the best. No human vaccines yet exist for WNV or EEE, although effective vaccines for both viruses are now available for horses .

Fortunately, transmission of EEE to humans is naturally a relatively rare event, and modern mosquito control programs along the East Coast work hard to make such events even rarer. A major impetus for the start of modern mosquito control programs in the Mid-Atlantic region was the 1959 EEE outbreak in Cape May County, New Jersey that occurred around Labor Day, leading to the deaths of over 20 victims and hospitalizations of over 100 people (along with some severe economic consequences for a tourism-based area). Even with a subsequent expansion and increased effectiveness of mosquito control programs in the Mid-Atlantic, localized EEE outbreaks have occurred since then, not only in New Jersey but also in eastern Massachusetts, Rhode Island, upstate New York, southeastern Virginia, and northeastern North Carolina. Fortunately, the numbers of human cases in these EEE outbreaks were relatively low. The most recent documented human case of EEE in Delaware occurred in the mid-1980's -- the Mosquito Control Section takes considerable pride in our keeping things this way, such that EEE does not have major impacts on Delawareans, with the chances of you contracting EEE exceedingly small.

The introduction of WNV into the United States (and really anywhere in the Western Hemisphere) occurred in the New York City area during the summer of 1999 (causing 62 hospitalizations and 7 deaths at that time). Over the span since 1999, the virus has spread southward and westward across the country -- WNV human cases have now been reported in all lower 48 states with exception of Maine. The total number of reported annual WNV human cases and fatalities across the U.S. is shown below from 1999-2007:

1999 = 62 cases, 7 deaths
2000 = 21 cases, 2 deaths
2001 = 66 cases, 9 deaths
2002 = 4156 cases, 284 deaths
2003 = 9862 cases, 264 deaths
2004 = 2359 cases, 100 deaths
2005 = 3000 cases, 119 deaths
2006 = 4269 cases, 177 deaths
2007 = 3630 cases, 124 deaths

Delaware's first WNV human case occurred in 2002, and Delaware's peak WNV outbreak year for human cases to date happened in 2003, with 17 people reported sickened by WNV (involving 13 neuroinvasive cases), leading to 2 deaths. WNV counts in Delaware then declined considerably, with no cases in 2004, 2 cases in 2005, no cases in 2006, and 1 case in 2007, with no more fatalities. The relatively low numbers of WNV

human cases in Delaware in terms of total numbers or per capita reflect the results of the State having a modern-day, comprehensive mosquito control keeping pathogen-vectoring populations of mosquitoes as low as practicable to do, along with a general subsidence of WNV in the Northeast starting in 2004 (although WNV has continued to flare-up in other areas of the country since then, particularly in California and upper Great Plains states. The Mosquito Control Section will continue to work hard to try to keep this disease out of our state's human population for to extent practicable to do.

People can take some comfort that scientists estimate even in areas where WNV has now become established, probably less than 1% of the mosquito populations that can carry this virus are infected, and that if you are unlucky to be bitten by one of these <1%, there's then only about a 1% chance that you'll become severely ill. With the Mosquito Control Section aggressively taking measures (as described in FAQs #1, 2, 3, and 4) to reduce the frequency and intensity that you might get bit [note: if there are no or only a few bites to start with, then the naturally small chance of your ever encountering an infected mosquito goes almost to zero], along with your also taking some personal protection measures on your own (as described in FAQ #8), the chance of your ever contracting WNV is truly exceedingly small.

Additional information about the human health problems/symptoms of WNV, or concerns for its possible contraction, can be obtained by calling the **Delaware Division of Public Health (Epidemiology Branch)** at its office in Dover at **302-744-4541**.