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West Nile Virus[1]

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What Is West Nile Virus and How Does It Affect Humans and Horses?

West Nile (WN) virus is carried by mosquitoes and if transmitted to humans, it can cause severe encephalitis. It is closely related to St. Louis Encephalitis (SLE) virus which is sometimes a problem in Florida. West Nile virus was first isolated in 1937, from a woman in the West Nile province of Uganda in Central Africa. Epidemics of WN have occurred in Israel, France, South Africa, and Romania. West Nile virus was first documented in the United States in New York City (NYC) during an epidemic in August 1999.

Human West Nile Fever and West Nile Virus Encephalitis

Most humans who are infected with the WN virus do not develop illness. Approximately 20% of the people who are infected will exhibit fever, headache, body aches, swollen lymph glands, and a skin rash - this is defined as West Nile Fever.

More severe infections include headache, high fever, neck stiffness, disorientation, coma, convulsions, muscle weakness and paralysis. This severe form of the infection is defined as West Nile Virus Encephalitis. About 1 out of every 150 infections will result in encephalitis. Symptoms of WN fever typically last a few days while the severe disease may last several weeks to months with some permanent neurological effects.

West Nile Virus in Horses

Horses infected with WN virus can exhibit signs of ataxia (the most common sign) which more often affects the rear limbs, causing stumbling, staggering, wobbly gait, and incoordination. Other signs include teeth grinding, muscle fasciculation, going down with difficulty and inability to rise, facial paralysis, or twitching and blindness. Treatment of infected horses is often based on clinical signs and reducing the severity of the disease. Fluid and nutrient supportive therapy may be required.

According to USDA-APHIS Veterinary Services, horses that are infected with WN virus *are not required to be euthanized*. Horses are incidental hosts and it is unlikely that mosquitoes feeding on infected horses could ingest enough of the virus to transmit it to other animals. Horses are euthanized only when they are suffering from severe encephalitis

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from which they will not be able to recover. Also, because horses are dead-end hosts, quarantines are unnecessary.

How Does the Virus Get into Humans and Horses?

The most important mode of transmission of the WN virus to humans and horses is from the bite of an infected mosquito. Mosquitoes obtain the virus from feeding on infected birds. The virus is then passed to humans when an infected female mosquito takes a second blood meal from a human instead of a bird. As they are feeding on human blood, they release saliva that contains the virus. The saliva then enters the human bloodstream carrying the virus with it.

The mosquito species that are most likely to be inportant in WV virus transmission are members of the genus *Culex*. Several species have been implicated in WN outbreaks elsewhere in the world, and there is evidence in Florida that *Culex nigripalpus* is an important vector. These particular mosquitoes lay their eggs in flooded citrus groves, catch basins, sewers, cisterns, and temporary flood waters. The peak time for blood-feeding of this mosquito species is between sunset and sunrise.

Rare Forms of WN Virus Transmission

A very small proportion of WN cases have come from other routes of infection than the mosquito. A small number of confirmed cases have occurred from organ transplants, blood transfusion, mother-to-child (1 case), and 3 laboratory workers who were working on WN infected animals. West Nile virus is not transmitted from one human to another. Also, it is not transmitted from birds to humans or horses to humans. There is no evidence that WN virus can be transmitted to humans by consumption of infected birds or animals or their eggs. If a human, horse, or wild bird is infected with the virus, it is assumed that immunity will be lifelong.

West Nile Virus in Florida

West Nile virus was detected in a single dead crow in Jefferson County, FL, collected on June 18, 2001, heralding the arrival of West Nile to Florida. Since that time, confirmed cases in humans and horses have been reported in Florida (Table 1).

West Nile virus has been reported from sentinel chickens throughout Florida. Mosquito control districts, state and local health departments, and the Centers for Disease Control may test dead birds, sentinel birds, mosquitoes, and horses for WN virus. Tests that are confirmed positive are reported by the Florida Department of Health. Authorities will then make decisions about what strategies to use to reduce risk of exposure to WN virus based on scientific information about the virus and vectors involved, the risk to humans, and local or regional environmental conditions.

How Can the Risk of Exposure to West Nile be Reduced?

Vaccines for humans are *not* currently available for the vast majority of arthropod-borne pathogens including WN and SLE. Pay attention to medical and veterinary alerts and follow the specific recommendations. Medical alerts will be posted on the FMEL Encephalitis Information System at http://eis.ifas.ufl.edu.

The best method of reducing risk of exposure is to avoid mosquito bites through personal protection by wearing mosquito repellents and protective clothing during times when mosquitoes are most active.

Personal Protection

Personal protection against biting arthropods, particularly when they are infected with dangerous pathogens, remains one of the most important ways to avoid disease. Avoid mosquitoes. Make sure screens are in good repair to prevent mosquitoes from entering homes. If you must enter areas where there is a threat of encountering infected mosquitoes, wear protective clothing.

Finally, use a personal insect repellent that provides a reasonable Complete Protection Time (CPT). The CPT is the total time following repellent application that the treated individual will remain bite free. For example, under normal conditions the CPT for a 5% formulation of DEET (diethyl toluamide,

presently the most effective insect repellent) is approximately 2 hours. The CPT for a 24% DEET formulation is more than 4 hours. For more information on repellents, refer to the University of Florida/IFAS Fact Sheet ENY-633 "Avoiding and Repelling Mosquitoes and Other Biting Arthropods."

- Avoid exposure to mosquitoes - stay indoors during peak biting time.
- If you must be outside during peak biting time, wear long sleeves and pants.
- Wear mosquito repellents when outside during peak biting time. Use mosquito repellents containing DEET. Be sure to follow the directions on the label.
- Make sure window and door screens are in good repair to prevent mosquitoes from entering homes.
- Remove unnecessary sources of water outside the home that may provide breeding places for mosquitoes.
- Flush out the water in bird baths and outdoor pet dishes every 3 - 4 days.
- Remove leaf litter, standing water and debris from roof gutters and boat covers.
- For more information see: The Florida Medical Entomology Lab's Fact Sheet on Personal Protection (ENY-633 Avoiding and Repelling Mosquitoes and Other Biting Arthropods).

Public Protection

Fortunately, the USA has some of the best mosquito and arthropod control programs in the world. Vector control and personal protection against vectors and the diseases they carry are the best way to avoid infection with vector-borne pathogens. Strategies that might be effective against WN virus infection include: source reduction of mosquito breeding sites; focal applications of insecticides directed against adult and immature mosquitoes; Public Service Announcements to educate residents about the vector, the disease, and disease avoidance; tips to help prevent home-invasion by infected vectors; and information about the most effective means of personal protection. SLE and WN epidemics and outbreaks in Florida have proved that effective means of reducing human infection is to widely disseminate accurate information through the media to educate the public. An individual's first line of defense during a vector-borne disease emergency is knowledge and personal protection.

Vaccine for Horses

Florida Agriculture Commissioner Charles H. Bronson urges all equine owners to have their horses vaccinated against WN and to be vigilant about receiving booster shots at regular intervals. For more information on this vaccine, contact your veterinarian or call the Florida Department of Agriculture and Consumer Services WN vaccine hotline: 850-410-0900. Horses that have been vaccinated against Eastern Equine Encephalitis (EEE) are *not* protected from WN virus.

Further information on West Nile

For updates on the current situation on West Nile and other mosquito-borne diseases in Florida, visit the Florida Medical Entomology Laboratory's Encephalitis Information System to view current health alerts (http://eis.ifas.ufl.edu). Additionally, information is provided to assist readers in understanding the real risk of exposure to the mosquito-borne viruses in Florida.

Other Mosquito-borne Diseases in Florida

For information on other mosquito-borne diseases, see the following Fact Sheets from the Florida Medical Entomology Lab, University of Florida, IFAS.

- Dog Heartworm (ENY-628)
- Eastern Encepahlitis (ENY-631)
- Malaria (ENY-700-6-2)
- St. Louis Encephalitis (ENY-700-6-3)

Table 1. Confirmed Human and Horse Cases in Florida

	2001	2002
Human West Nile Virus Encephalitis	**12**	**28**
Human West Nile Fever		**7**
Human Fatalities		**2**
Horse Cases	**>450**	**>499**