WEST NILE VIRUS

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WHAT IS WEST NILE VIRUS?

West Nile virus is a mosquito-borne flavivirus, and a human, equine, and avian (bird) neuropathogen. The virus is thought to have originated in Africa, Asia, Europe, and Australia, and has recently caused large epidemics in Romania, Russia, and Israel. West Nile virus is maintained in nature in a mosquito-bird-mosquito transmission cycle, primarily involving *Culex* species mosquitoes. However, the virus has been isolated from 29 mosquito species belonging to ten genera in the United States alone.

Birds are the natural reservoir hosts for West Nile virus. At least 111 bird species in North America have been infected with the virus. Most infected birds survive the infection by developing permanent immunity; birds typically amplify the virus. Mosquitoes feeding on birds can then transmit the amplified virus into humans, animals, and other birds. Although some birds such as crows and jays, tend to become ill and die. West Nile virus surveillance programs use dead-bird concentrations for detecting and tracking the virus on a regional basis.

It is widely suggested that humans and animals (mainly horses) are dead-end hosts for the West Nile virus; however this is not conclusive. There have been reported cases where the virus has been transmitted to other humans through blood and organ donations.

DEFINITIONS

Virus – An ultramicroscopic infectious agent that replicates itself only within cells of living hosts.

Flavivirus – A group of about 70 positive stranded RNA viruses, many of which are transmitted to humans or animals by infected ticks or mosquitoes.

Neuropathogen – A disease-causing organism that destroys or damages the body's nervous system.

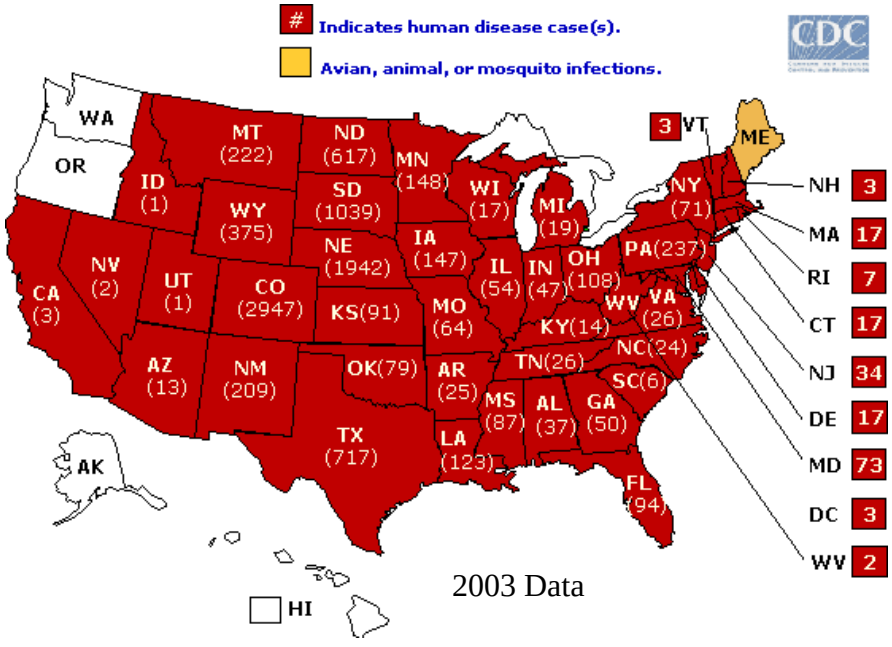
Meningitis – Inflammation of the meninges, the membrane envelopes that encase the brain and spinal cord.

Encephalitis – Inflammation of the brain.

Meningoencephalitis – An inflammation or infection of the brain and spinal cord and their membranes.

IS WEST NILE VIRUS SPREADING IN THE UNITED STATES?

West Nile virus was first introduced in the United States in 1999, when it was detected in New York City, New York, during an epidemic of meningoencephalitis. This epidemic resulted in 59 hospitalized cases and seven deaths. West Nile virus continued to spread in 1999 and 2000 with new outbreaks in the New York City metropolitan area, New Jersey, and Connecticut, where 83 human cases of the virus were reported and nine individuals died. In 2002, 4,156



2003 Data

positive human cases of West Nile virus spread to 39 eastern and mid-western states and the District of Columbia, resulting in 284 confirmed deaths.

In 2003, 9,858 human cases of West Nile virus were detected in all but three of the 48 contiguous states, resulting in 264 confirmed deaths. West Nile virus is obviously spreading geographically; however, recent improvements in testing and diagnosis may help to explain the dramatic increase in documented human cases of West Nile virus in the last few years.

Because West Nile virus is relatively new to the United States, symptoms of West Nile virus (especially mild reactions) are sometimes not easily distinguishable from some of the other mosquito-borne infections which cause similar reactions, such as St. Louis Encephalitis and Eastern Equine Encephalitis. Today, as physicians and laboratory personnel make a diagnosis of West Nile virus, the case is reported to the state health department. The state may then confirm the diagnosis using special tests, and, if they agree with the diagnosis, the case is then reported to the Centers for Disease Control and Prevention (CDC) through a system called ARBONET. ARBONET is a national system for monitoring mosquito-borne infections.

Table 1. Human West Nile Virus Cases

State	Human Cases		Deaths	
	2002	2003	2002	2003
Alabama	49	37	3	3
Arizona	0	13	0	1
Arkansas	43	25	3	0
California	1	3	0	0
Colorado	14	2,947	0	61
Connecticut	17	17	0	0
Delaware	1	17	0	2
District of Columbia	34	3	1	0
Florida	28	94	2	6
Georgia	44	50	7	4
Idaho	0	1	0	0
Illinois	884	54	64	1
Indiana	293	47	11	4
Iowa	54	147	2	6
Kansas	22	91	0	4
Kentucky	75	14	5	1
Louisiana	329	123	25	8
Maryland	36	73	7	8
Massachusetts	23	17	3	1
Michigan	614	19	51	2
Minnesota	48	148	0	4
Mississippi	192	87	12	1
Missouri	168	64	7	8
Montana	2	222	0	4
Nebraska	152	1,942	7	29
Nevada	0	2	0	0
New Hampshire	0	3	0	0
New Jersey	24	34	0	3
New Mexico	0	209	0	4
New York	82	71	5	11
North Carolina	2	24	0	2
North Dakota	17	617	2	7
Ohio	441	108	31	8
Oklahoma	21	79	2	0
Pennsylvania	62	237	7	8
Rhode Island	1	7	0	1
South Carolina	1	6	0	0
South Dakota	37	1,039	0	14
Tennessee	56	26	7	1
Texas	202	717	13	37
Utah	0	1	0	0
Vermont	1	3	0	0
Virginia	29	26	2	1
West Virginia	3	2	2	0
Wisconsin	52	17	3	0
Wyoming	2	375	0	9
Total	**4,156**	**9,858**	**284**	**264**

WHAT ARE SYMPTOMS OF WEST NILE VIRUS?

Most West Nile virus infections do not result in any symptoms. According to the CDC, only about two persons of every ten who are bitten by an infected mosquito will experience any illness. Minor symptoms include sudden onset of fever, headache, muscle pains, and fatigue lasting less than a week. However, one in 150 persons will develop meningitis or encephalitis, which may result in metal changes, neck stiffness, disorientation, profound muscle weakness, paralysis, respiratory failure, and coma. Less than one out of 1,000 infected people die of encephalitis, usually those in older age groups or who have other medical conditions.

IS THERE A VACCINATION?

Although there is a West Nile vaccination for horses, there is currently no approved vaccination to protect humans from contracting West Nile virus. Rather, common practice is to treat the resulting symptoms. Treatment of severe illnesses includes hospitalization, use of intravenous fluids and nutrition, respiratory support, prevention of secondary infections, and good nursing care. It is likely that some infected persons will build up a natural immunity to West Nile virus; however it is not practical to assume that the entire population would become immune through natural exposure.

The National Institute of Health is currently funding research to improve diagnosis and prevention, use and develop vaccines, develop antiviral medicines to treat the disease, and research the virus itself. Some approaches include mixing West Nile virus with the already established yellow fever vaccine, creating inactive, nonreplicating, live West Nile protein inoculation, and extracting the antibodies from the blood of people who have recovered from West Nile infection.

HOW DO I PROTECT MYSELF FROM WEST NILE VIRUS?

Community Protection – Municipalities, health professionals, and community members must work together to stop the spread of West Nile virus. Four essential elements of an effective prevention program include:

- Surveillance: A community-based, comprehensive surveillance program is necessary to quickly identify the location and intensity of virus-carrying mosquitoes, bird hosts, breeding areas, and infected persons and animals. Over time, common mosquito breeding sites will be identified, enabling local municipalities to use targeted control measures and save resources. Physicians and other health professionals should conduct the appropriate tests for West Nile virus and report all positive cases. This will also help to identify where virus-carrying mosquitoes reside.

- Preventative Treatment: Targeted control should be implemented early in the year to disrupt springtime viral amplification in birds and mosquitoes. Emphasis should be on larval control using an integrated approach involving source reduction, water management, chemicals, and biological control methods. Chemical spraying of pesticides to control adult mosquitoes should be reserved for emergency application after the West Nile virus has been detected in the community. The goal of preventative treatment should be to control the mosquito population early enough to prevent or decrease the risk of human and animal infection.

- Reporting: Individuals should report the location of any areas where mosquitoes are likely to breed, including areas where water is standing stagnant for more than three consecutive days. Keep a close watch on drainage ditches. Report to local authorities any clogged drainage culverts that cause water to back up and stand for more than a few days.

- Public Education: A comprehensive public outreach campaign is essential to educating community members on how to avoid or decrease the risk of being bitten by infected mosquitoes. Information should also include a procedure to report mosquito breeding sites, how to handle and report dead birds that may be infected with West Nile virus, and what to do if the individual suspects he or she has been infected.

Personal Protection – There is much that individuals can do to reduce the risk of being bitten by infected mosquitoes. Most importantly, survey your lawn and landscape for potential mosquito breeding areas and eliminate them.

- Make sure water drains from your lawn and does not stand for extended periods of time. If necessary, install underground drainage, especially in areas directly around your house.
- If you already have a drainage system, make sure it works properly. Drain basins are common breeding areas for mosquitoes.
- Mow the lawn regularly, and keep the lawn free of standing water.
- Empty standing water in old tires, buckets, plastic covers, toys, or any other container where mosquitoes may lay their eggs.
- Empty and change the water in bird baths, fountains, wading pools, rain barrels, animal watering containers, and potted plant trays at least once a week if not more often.
- Check your sprinkler system to make sure you are irrigating the proper amount.
- Drain or fill temporary pools with dirt.
- Keep swimming pools treated and circulating, and rain gutters unclogged.
- Use mosquito repellants when necessary, and follow label directions and precautions closely. Repellants containing DEET (N,N-diethyl-m-toluamide) as the active ingredient are recommended

for application to clothing and exposed skin. Repellants containing permethrin can be applied to clothing.

- Wear head nets, long sleeves, and long pants if you venture into areas with high mosquito populations, such as salt marshes.
- Stay inside when mosquitoes are most active (usually dawn and dusk) or if there is a mosquito-borne disease warning in effect.
- Make sure window and door screens are “bug tight.”
- Replace your outdoor lights with yellow “bug” lights.
- Contact your local mosquito control district or health department. Neighborhoods are occasionally sprayed to prevent disease and nuisance caused by large mosquito numbers. If you have any questions about mosquitoes and their control, call your local authorities.

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