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Division of Vector-Borne Infectious Diseases

West Nile Virus

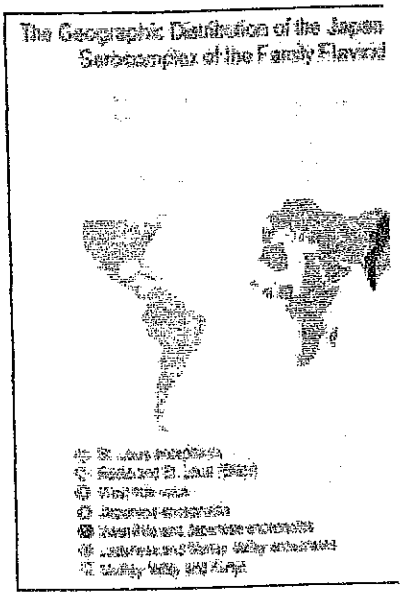
Contents

Background

Introduction: West Nile (WN) virus has emerged in recent years in temperate reg Europe and North America, presenting a threat to public, equine, and animal health. serious manifestation of WN virus infection is fatal encephalitis (inflammation of t humans and horses, as well as mortality in certain domestic and wild birds.

History: West Nile virus was first isolated from a febrile adult woman in the West District of Uganda in 1937. The ecology was characterized in Egypt in the 1950s. became recognized as a cause of severe human meningoencephalitis (inflammation spinal cord and brain) in elderly patients during an outbreak in Israel in 1957. Equi was first noted in Egypt and France in the early 1960s. The appearance of WN vir America in 1999, with encephalitis reported in humans and horses, may be an impc milestone in the evolving history of this virus.

Geographic Distribution: West Nile virus has been described in Africa, Europe, the Middle East, west and central Asia, Oceania (subtype Kunjin), and most recently, North America. Recent outbreaks of WN virus encephalitis in humans have occurred in Algeria in 1994, Romania in 1996-1997, the Czech Republic in 1997, the Democratic Republic of the Congo in 1998, Russia in 1999, the United States in 1999-2000, and Israel in 2000. Epizootics of disease in horses occurred in Morocco in 1996, Italy in 1998, the United States in 1999-2000, and France in 2000. In the U.S. through September 2000, WN virus has been documented in Connecticut, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and the District of Columbia.



larger view

Classification:

- **Family:** Flaviviridae
- **Genus:** Flavivirus Japanese Encephalitis Antigenic Complex
- **Complex includes:** Alfuy, Cacipacore, Japanese encephalitis, Koutango, Murray Valley encephalitis, St. Louis encephalitis, Rocio, Stratford, Usutu and Yaounde viruses.
- **Flaviviruses:** share a common size (40-60nm), symmetry (enveloped, ico nucleocapsid), nucleic acid (positive-sense, single stranded RNA approxim 10,000-11,000 bases), and appearance in the electron microscope.

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West Nile Virus: What You Need To Know

CDC Fact Sheet

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- Downloadable prevention brochure
- Video: Public Service Announcement

What Is West Nile Virus?

West Nile virus (WNV) is a potentially serious illness. Experts believe WNV is established as a seasonal epidemic in North America that flares up in the summer and continues into the fall. This fact sheet contains important information that can help you recognize and prevent West Nile virus.

What Can I Do to Prevent WNV?

The easiest and best way to avoid WNV is to prevent mosquito bites.

- When you are outdoors, use insect repellent containing an EPA-registered active ingredient. Follow the directions on the package.
- Many mosquitoes are most active at dusk and dawn. Be sure to use insect repellent and wear long sleeves and pants at these times or consider staying indoors during these hours.
- Make sure you have good screens on your windows and doors to keep mosquitoes out.
- Get rid of mosquito breeding sites by emptying standing water from flower pots, buckets and barrels. Change the water in pet dishes and replace the water in bird baths weekly. Drill holes in tire swings so water drains out. Keep children's wading pools empty and on their sides when they aren't being used.

What Are the Symptoms of WNV?

- **Serious Symptoms in a Few People**. About one in 150 people infected with WNV will develop severe illness. The severe symptoms can include high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness and paralysis. These symptoms may last several weeks, and neurological effects may be permanent.

- **Milder Symptoms in Some People.** Up to 20 percent of the

people who become infected have symptoms such as fever, headache, and body aches, nausea, vomiting, and sometimes swollen lymph glands or a skin rash on the chest, stomach and back. Symptoms can last for as short as a few days, though even healthy people have become sick for several weeks.

- **No Symptoms in Most People**. Approximately 80 percent of people (about 4 out of 5) who are infected with WNV will not show any symptoms at all.

How Does West Nile Virus Spread?

- **Infected Mosquitoes.** Most often, WNV is spread by the bite of an infected mosquito. Mosquitoes become infected when they feed on infected birds. Infected mosquitoes can then spread WNV to humans and other animals when they bite.
- **Transfusions, Transplants, and Mother-to-Child.** In a very small number of cases, WNV also has been spread through blood transfusions, organ transplants, breastfeeding and even during pregnancy from mother to baby.
- **Not through touching.** WNV is not spread through casual contact such as touching or kissing a person with the virus.

How Soon Do Infected People Get Sick?
People typically develop symptoms between 3 and 14 days after they are bitten by the infected mosquito.

How Is WNV Infection Treated?
There is no specific treatment for WNV infection. In cases with milder symptoms, people experience symptoms such as fever and aches that pass on their own, although even healthy people have become sick for several weeks. In more severe cases, people usually need to go to the hospital where they can receive supportive treatment including intravenous fluids, help with breathing and nursing care.

What Should I Do if I Think I Have WNV?
Milder WNV illness improves on its own, and people do not necessarily need to seek medical attention for this infection though they may choose to do so. If you develop symptoms of severe WNV illness, such as unusually severe headaches or confusion, seek medical attention immediately. Severe WNV illness usually requires hospitalization. Pregnant women and nursing mothers are encouraged to talk to their doctor if they develop symptoms that could be WNV.

What Is the Risk of Getting Sick from WNV?

People over 50 at higher risk to get severe illness.
People over the age of 50 are more likely to develop serious symptoms of WNV if they do get sick and should take special care to avoid mosquito bites.

Being outside means you're at risk. The more time you're outdoors, the more time you could be bitten by an infected

mosquito. Pay attention to avoiding mosquito bites if you spend a lot of time outside, either working or playing.

Risk through medical procedures is very low. All donated blood is checked for WNV before being used. The risk of getting WNV through blood transfusions and organ transplants is very small, and should not prevent people who need surgery from having it. If you have concerns, talk to your doctor.

Pregnancy and nursing do not increase risk of becoming *infected with* WNV. The risk that WNV may present to a fetus or an infant infected through breastmilk is still being evaluated. Talk with your care provider if you have concerns.

What Is the CDC Doing About WNV?
CDC is working with state and local health departments, the Food and Drug Administration and other government agencies, as well as private industry, to prepare for and prevent new cases of WNV.

Some things CDC is doing include:

- Coordinating a nation-wide electronic database where states share information about WNV
- Helping states develop and carry out improved mosquito prevention and control programs
- Developing better, faster tests to detect and diagnose WNV
- Creating new education tools and programs for the media, the public, and health professionals
- Opening new testing laboratories for WNV
- Working with partners on the development of vaccines

What Else Should I Know?

If you find a dead bird: Don't handle the body with your bare hands. Contact your local health department for instructions on reporting and disposing of the body. They may tell you to dispose fo the bird after they log your report.

For more information call the CDC public response hotline at (888) 246-2675 (English), (888) 246-2857 (Español), or (866) 874-2646 (TTY)

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Questions and Answers

Please use the menu below to jump to a topic:

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Overview of West Nile Virus

Q: What is West Nile virus?
A. West Nile Virus is a flavivirus commonly found in Africa, West Asia, and the Middle East. It is closely related to St. Louis encephalitis virus which is also found in the United States. The virus can infect humans, birds, mosquitoes, horses and some other mammals

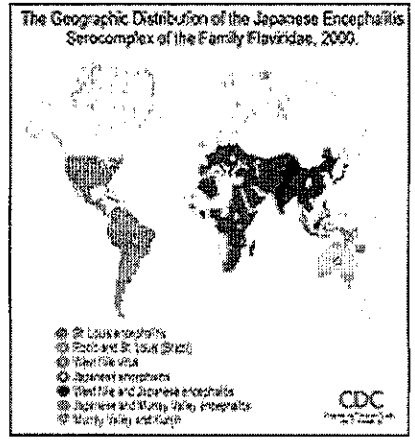
Q. What are West Nile encephalitis, West Nile meningitis and "neuroinvasive disease" and West Nile fever?
A. The most severe type of disease due to a person being infected with West Nile virus is sometimes called "neuroinvasive disease" because it affects a person's nervous system. Specific types of neuroinvasive disease include: West Nile encephalitis, West Nile meningitis or West Nile meningoencephalitis. Encephalitis refers to an inflammation of the brain, meningitis is an inflammation of the membrane around the brain and the spinal cord, and meningoencephalitis refers to inflammation of the brain and the membrane surrounding it. West Nile Fever is another type of illness that can occur in people who become infected with the virus. It is characterized by fever, headache, tiredness, aches and sometimes rash. Although the illness can be as short as a few days, even healthy people have been sick for several weeks.

Q. Historically, where has West Nile encephalitis occurred worldwide?
A. See the map describing distribution of flaviviruses, including West Nile virus:

Q. How long has West Nile virus been in the U.S.?
A. It is not known how long it has been in the U.S., but CDC scientists believe the virus has probably been in the eastern U.S. since the early summer of 1999, possibly longer.

Q. I understand West Nile virus was found in "overwintering" mosquitoes in the New York City area in early 2000. What does this mean?
A. One of the species of mosquitoes found to carry West Nile virus is the *Culex* species which survive through the winter, or "overwinter," in the adult stage. That the virus survived along with the mosquitoes was documented by the widespread transmission the summer of 2000.

Q. Is West Nile virus now established in the Western Hemisphere?
A. The continued expansion of West Nile virus in the United States indicates that it is permanently established in the Western Hemisphere.



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Q. Is the disease seasonal in its occurrence?
A. In the temperate zone of the world (i.e., between latitudes 23.5° and 66.5° north and south), West Nile encephalitis cases occur primarily in the late summer or early fall. In the southern climates where temperatures are milder, West Nile virus can be transmitted year round.

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West Nile Virus Home > FAQ Index > Cases of West Nile Encephalitis

Questions and Answers

Please use the menu below to jump to a topic:

West Nile Virus Topics: go

Cases of West Nile Human Disease

Q. How many cases of West Nile disease in humans have occurred in the U.S.?
A. Our Statistics, Surveillance, and Control page contains maps showing the distribution of West Nile virus-related human disease cases, by state, in the U.S. in 2004.

Please see CDC's current case count for the number and nature of human cases of West Nile virus-related disease reported in the U.S. in 2004.

In 2003, there were 9862 human cases of WNV disease reported, including 264 deaths. For a report of cases by clinical syndrome and by state, please see the 2003 human disease cases.

In 2002, there were 4156 human cases of WNV disease, including 284 deaths. Cases were reported throughout much of the US; for a report of cases by each state please refer to the 2002 human case count. In 2001, there were 66 human cases of severe disease and 9 deaths. In 2000, 21 cases were reported, including 2 deaths in the New York City area. In 1999, 62 cases of severe disease, including 7 deaths, occurred in the New York area.

There are no reliable estimates are available for the number of cases of West Nile encephalitis that occur worldwide.

Q. What proportion of people with severe illness due to West Nile virus die?

A. Among those with severe illness due to West Nile virus, case-fatality rates range from 3% to 15% and are highest among the elderly.

Less than 1% of people who become infected with West Nile virus will develop severe illness -- most people who get infected do not develop any disease at all.

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Questions and Answers

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Who's at Risk for West Nile Virus

Q. Who is at risk for getting West Nile encephalitis?
A. All residents of areas where virus activity has been identified are at risk of getting West Nile encephalitis; persons over 50 years of age have the highest risk of severe disease. It is unknown if immunocompromised persons are at increased risk for WNV disease.

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Questions and Answers

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Transmission

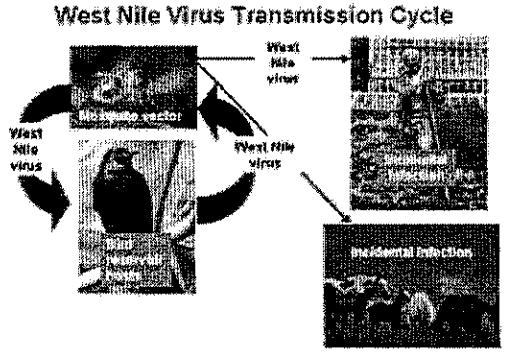
Q. How do people get infected with West Nile virus (WNV)?
A. The main route of human infection with West Nile virus is through the bite of an infected mosquito. Mosquitoes become infected when they feed on infected birds, which may circulate the virus in their blood for a few days. The virus eventually gets into the mosquito's salivary glands. During later blood meals (when mosquitoes bite), the virus may be injected into humans and animals, where it can multiply and possibly cause illness.

Additional routes of human infection became apparent during the 2002 West Nile epidemic. It is important to note that these other methods of transmission represent a very small proportion of cases. Investigations have identified WNV transmission through transplanted organs and through blood transfusions. See Blood Transfusions and Transmission: Questions and Answers.

There is one reported case of transplacental (mother-to-child) WNV transmission. This case is detailed in MMWR Dec 20, 2002. There is also one reported case of transmission of WNV through breast-milk. See Questions and Answers concerning WNV and breastfeeding for more information on this topic.

Although transmission of WNV and similar viruses to laboratory workers is not a new phenomenon, two recent cases of WNV infection of laboratory workers have been reported. These cases are detailed in MMWR Dec 20, 2002.

Q. What is the basic transmission cycle of West Nile virus?
A. Mosquitoes become infected when they feed on infected birds, which may circulate the virus in their blood for a few days. Infected mosquitoes can then transmit West Nile virus to humans and animals while biting to take blood. The virus is located in the mosquito's salivary glands. During blood feeding, the virus may be injected into the animal or human, where it may multiply, possibly causing illness.



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Q. If I live in an area where birds or mosquitoes with West Nile virus have been reported and a mosquito bites me, am I likely to get sick?
A. No. Even in areas where the virus is circulating, very few mosquitoes are infected with the virus. Even if the mosquito is infected, less than 1% of people who get bitten and become infected will get severely ill. The chances you will become severely ill from any one mosquito bite are extremely small.

Q. Can you get West Nile encephalitis from another person?
A. No. West Nile encephalitis is NOT transmitted from person-to-person. For example, you cannot get West Nile virus from touching or kissing a person who has the disease, or from a health care worker who has treated someone with the disease.

Q. Is a woman's pregnancy at risk if she gets infected with West Nile virus?
A. There is one documented case of transplacental (mother-to-child) transmission of WNV in a human. Although the newborn in this case was infected with WNV at birth and had severe medical problems, it is unknown whether the WNV infection itself caused these problems or whether they were coincidental. More research will be needed to improve our understanding of the relationship - if any - between WNV infection and adverse birth outcomes.

Nevertheless, pregnant women should take precautions to reduce their risk for WNV and other arboviral infections by avoiding mosquitoes, using protective clothing, and using repellents containing DEET (See Using Repellent Safely). When WNV transmission is occurring in an area, pregnant women who become ill should see their health care provider, and those whose illness is consistent with acure WNV infection, should undergo appropriate diagnostic testing.

See MMWR Dec 20, 2002 for more information.

Q. Can West Nile virus be transmitted through blood transfusions?
A. Please refer to Blood Transfusions and Transmission: Questions and Answers.

Q. Besides mosquitoes, can you get West Nile virus directly from other insects or ticks?
A. Infected mosquitoes are the primary source for West Nile virus. Although ticks infected with West Nile virus have been found in Asia and Africa, their role in the transmission and maintenance of the virus is uncertain. However, there is no information to suggest that ticks played any role in the cases identified in the United States.

Q. How many types of animals have been found to be infected with West Nile virus?
A. Although the vast majority of infections have been identified in birds, WN virus has been shown to infect horses, cats, bats, chipmunks, skunks, squirrels, and domestic rabbits.

Q. Can you get West Nile virus directly from birds?
A. There is no evidence that a person can get the virus from handling live or dead infected birds. However, persons should avoid bare-handed contact when handling *any* dead animals and use gloves or double plastic bags to place the carcass in a garbage can.

Q. Can you get infected with West Nile virus by caring for an infected horse?
A. West Nile virus is transmitted by infectious mosquitoes. There is no documented evidence of person-to-person or animal-to-person transmission of West Nile virus. Normal veterinary infection control precautions should be followed when caring for a horse suspected to have this or any viral infection.

Q. Can you get WNV from eating game birds or animals that have been infected?
A. There is no evidence that WNV virus can be transmitted to humans through consuming infected birds or animals. In keeping with overall public health practice, and due to the risk of known food-borne pathogens, people should always follow procedures for fully cooking meat from either birds or mammals.

Q. How does West Nile virus actually cause severe illness and death in humans?
A. Following transmission by an infected mosquito, West Nile virus multiplies in the person's blood system and crosses the blood-brain barrier to reach the brain. The virus interferes with normal central nervous system functioning and causes inflammation of brain tissue.

Q. How long does the West Nile virus remain in a person's body after they are infected?
A. There is no scientific evidence indicating that people can be chronically infected with West Nile virus. What remain in a person's body for long periods of time are antibodies and "memory" white blood cells (T-lymphocytes) that the body produces to the virus. These antibodies and T-lymphocytes last for years, and may last for the rest of a person's life. Antibodies are what many diagnostic tests look for when clinical laboratories testing is performed. Both antibodies and "memory" T-lymphocytes provide future protection from the virus.

Q. If a person contracts West Nile virus, does that person develop a natural immunity to future infection by the virus?

A. It is assumed that immunity will be lifelong; however, it may wane in later years.

See Also –

- West Nile Virus and Dogs and Cats
- West Nile Virus and Horses
- West Nile Virus and Birds
- West Nile Virus and Wild Game Hunters

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Questions and Answers

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Symptoms of West Nile Virus Updated! 8/16/2004

Q. What are the symptoms of West Nile virus (WNV) infection?
A. Infection with WNV can be asymptomtic (no symptoms), or can lead to **West Nile fever** or **severe West Nile disease.**

It is estimated that about 20% of people who become infected with WNV will develop **West Nile fever.** Symptoms include fever, headache, tiredness, and body aches, occasionally with a skin rash (on the trunk of the body) and swollen lymph glands. While the illness can be as short as a few days, even healthy people have reported being sick for several weeks.

The symptoms of **severe disease** (also called **neuroinvasive disease**, such as **West Nile encephalitis** or **meningitis** or **West Nile poliomyelitis**) include headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, and paralysis. It is estimated that approximately 1 in 150 persons infected with the West Nile virus will develop a more severe form of disease. Serious illness can occur in people of any age, however people over age 50 and some immunocompromised persons (for example, transplant patients) are at the highest risk for getting severely ill when infected with WNV.

Most people (about 4 out of 5) who are infected with West Nile virus will not develop any type of illness (an asymptomatic infection), however you cannot know ahead of time if you'll get sick or not when infected.

Q. What is the incubation period in humans (i.e., time from infection to onset of disease symptoms) for West Nile disease?
A. Usually 2 to 15 days.

Q. How long do symptoms last?
A. Symptoms of West Nile fever will generally last a few days, although even some healthy people report having the illness last for several weeks. The symptoms of severe disease (encephalitis or meningitis) may last several weeks, although neurological effects may be permanent.

Q. What is meant by West Nile encephalitis, West Nile meningitis, West Nile poliomyelitis, "neuroinvasive disease" and West Nile fever?
A. The most severe type of disease due to a person being infected with West Nile virus is sometimes called "neuroinvasive disease," because it affects a person's nervous system. Specific types of neuroinvasive disease include: West Nile encephalitis, West Nile meningitis, West Nile meningoencephalitis and West Nile poliomyelitis. Encephalitis refers to an inflammation of the brain, meningitis is an inflammation of the membrane around the brain and the spinal cord, meningoencephalitis refers to inflammation of the brain and the membrane surrounding it, and poliomyelitis refers to an inflammation of the spinal cord.

West Nile Fever is another type of illness that can occur in people who become infected with the virus. It is characterized by fever, headache, tiredness, aches and sometimes rash. Although the illness can be as short as a few days, even healthy people have been sick for several weeks.

Q. If I have West Nile Fever, can it turn into West Nile encephalitis?
A. When someone is infected with West Nile virus (WNV) they will typically have one of three outcomes: No symptoms (most likely), West Nile fever (WNF in about 20% of people) or severe West Nile disease, such as meningitis or encephalitis (less than 1% of those who get infected). *If you develop a high fever with severe headache, consult your health care provider.*

West Nile fever is characterized by symptoms such as fever, body aches, headache and sometimes swollen lymph glands and rash. West Nile fever generally lasts only a few days, though in some cases symptoms have been reported to last longer, even up to several weeks. West Nile fever does not appear to cause any permanent health effects. There is no specific treatment for WNV infection. People with West Nile fever recover on their own, though symptoms can be relieved through various treatments (such as medication for headache and body aches, etc.).

Some people may develop a brief, WNF-like illness (early symptoms) before they develop more severe disease, though the percentage of patients in whom this occurs is not known.

Occasionally, an infected person may develop more severe disease such as "West Nile encephalitis," "West

Nile meningitis" or "West Nile meningoencephalitis." Encephalitis refers to an inflammation of the brain, meningitis is an inflammation of the membrane around the brain and the spinal cord, and meningoencephalitis refers to inflammation of the brain and the membrane surrounding it. Although there is no treatment for WNV infection itself, the person with severe disease often needs to be hospitalized. Care may involve nursing IV fluids, respiratory support, and prevention of secondary infections.

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Questions and Answers

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Prevention

Q. What can I do to reduce my risk of becoming infected with West Nile virus?

A. Here are preventive measures that you and your family can take:

Protect yourself from mosquito bites:

- Apply insect repellent to exposed skin. Generally, the the more active ingredient a repellent contains the longer it can protect you from mosquito bites. A higher percentage of active ingredient in a repellent does not mean that your protection is better—just that it will last longer. Click here for more on insect repellent active ingredients. Choose a repellent that provides protection for the amount of time that you will be outdoors.
  - Repellents may irritate the eyes and mouth, so avoid applying repellent to the hands of children.
  - *Whenever you use an insecticide or insect repellent, be sure to read and follow the manufacturer's DIRECTIONS FOR USE, as printed on the product.*
  - For detailed information about using repellents, see the Insect Repellent Use and Safety questions.
- Spray clothing with repellents containing permethrin or another EPA-registered repellent since mosquitoes may bite through thin clothing. Do not apply repellents containing permethrin directly to exposed skin. Do not apply repellent to skin under your clothing.
- When weather permits, wear long-sleeved shirts and long pants whenever you are outdoors.

- Place mosquito netting over infant carriers when you are outdoors with infants.
- Consider staying indoors at dawn, dusk, and in the early evening, which are peak mosquito biting times.
- Install or repair window and door screens so that mosquitoes cannot get indoors.

Help reduce the number of mosquitoes in areas outdoors where you work or play, by draining sources of standing water. In this way, you reduce the number of places mosquitoes can lay their eggs and breed.

- At least once or twice a week, empty water from flower pots, pet food and water dishes, birdbaths, swimming pool covers, buckets, barrels, and cans.
- Check for clogged rain gutters and clean them out.
- Remove discarded tires, and other items that could collect water.
- Be sure to check for containers or trash in places that may be hard to see, such as under bushes or under your home.

Note: Vitamin B and "ultrasonic" devices are NOT effective in preventing mosquito bites.

Look! Kids can learn how to protect themselves from mosquito bites on "The Buzz-z-z-z on West Nile Virus" (on BAM!, the CDC site for kids).

Q. What can be done to prevent outbreaks of West Nile virus?
A. Prevention and control of West Nile virus and other arboviral diseases is most effectively accomplished through integrated vector management programs. These programs should include surveillance for West Nile virus activity in mosquito vectors, birds, horses, other animals, and humans, and implementation of appropriate mosquito control measures to reduce mosquito populations when necessary. Additionally, when virus activity is detected in an area, residents should be alerted and advised to increase measures to reduce contact with mosquitoes. Details about effective prevention and control of West Nile virus can be found in CDC's Guidelines for Surveillance, Prevention, and Control (286 KB, 111 pages).

Q. Is there a vaccine against West Nile encephalitis?
A. No, but several groups are working towards developing a vaccine.

Q. Where can I get information about the use of pesticide sprays that are being used for mosquito control?
A. The federal agency responsible for pesticide evaluation is the Environmental Protection Agency (EPA). See the EPA Web site for detailed answers to the questions about pesticides used for mosquito control.

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Questions and Answers

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Testing and Treating West Nile Virus in Humans UPDATED!

▸Questions about Commercial Laboratories NEW!

Q. I think I have symptoms of West Nile virus. What should I do?
A. Contact your health care provider if you have concerns about your health. If you or your family members develop symptoms such as high fever, confusion, muscle weakness, and severe headaches, you should see your doctor immediately.

Q. How do health care providers test for West Nile virus?
A. Your physician will first take a medical history to assess your risk for West Nile virus. People who live in or traveled to areas where West Nile virus activity has been identified are at risk of getting West Nile encephalitis; persons older than 50 years of age have the highest risk of severe disease. If you are determined to be at high risk and have symptoms of West Nile encephalitis, your provider will draw a blood sample and send it to a commercial or public health laboratory for confirmation.

Q. How are human cases of WNV diagnosed?
A. West Nile virus (WNV) infection can be suspected in a person based on clinical symptoms and patient history. Laboratory testing is required for a confirmed diagnosis.

The most commonly used WNV laboratory test measures antibodies that are produced very early in the infected person. These antibodies, called IgM antibodies, can be measured in blood or cerebrospinal fluid

(CSF), which is the fluid surrounding the brain and spinal cord. This blood test may not be positive when symptoms first occur; however, the test is positive in most infected people within 8 days of onset of symptoms.

A test for WNV IgM-antibody is used by CDC, state and local public health labs and increasingly at private laboratories. When testing is conducted at private laboratories, the health department or CDC will often confirm results in their own laboratories before officially reporting WNV cases.

In some instances, health departments may conduct or request additional testing from CDC before officially reporting a case to CDC's ArboNET Surveillance System. The state or CDC reference laboratory may repeat the initial IgM-antibody testing.

A state may also perform or ask CDC to perform an additional, different test on a specimen. This latter test (plaque reduction neutralization test [PRNT]) is usually performed when:

- the state finds its initial case(s) of human WNV illness,
- IgM results are not definitive due to equivocal laboratory testing results or insufficient specimens,
- the patient might have been exposed to other closely related viruses (like St. Louis encephalitis virus) which may result in a "false" positive laboratory test for WNV.

These additional tests require growth of the virus and may take a week or longer (plus shipping time) to conduct. The results from the PRNT are often needed before CDC considers a human WNV infection confirmed.

Q. How does CDC decide when to report a case of WNV?
A. CDC reports a case of WNV once a state officially reports and verifies that case to CDC.

The timing of the official report to CDC, relative to onset of symptoms in a person, is variable and depends on when an individual first seeks medical care and the extent of the laboratory testing, as described above, that the state determines is necessary before reporting.

At any given time, in addition to the official case count reported by CDC, there may be additional suspect cases under investigation or in various stages of testing, including supplemental or confirmatory laboratory testing.

Q. How many of the human WNV cases are being confirmed by the CDC laboratories?
A. When WNV was first found in the United States in 1999, the CDC reference laboratory confirmed all human cases of WNV. Through a comprehensive, CDC-sponsored laboratory training program, most states are now able to perform the initial blood tests to identify IgM-antibody in the blood or CSF of suspect human WNV infections, and many state laboratories are also able to perform the more involved PRNT. The CDC reference

lab is called upon for confirmatory testing by fewer and fewer states; although the increased activity of WNV still requires that many tests be performed at the CDC reference laboratory.

Q. How is West Nile encephalitis treated?
A. There is no specific treatment for West Nile virus infection. In more severe cases, intensive supportive therapy is indicated, often involving hospitalization, intravenous fluids, airway management, respiratory support (ventilator), prevention of secondary infections (pneumonia, urinary tract, etc.), and good nursing care.

Questions about Commercial Laboratories New!

Q.What role do commercial laboratories play in diagnosing people with West Nile virus infection?

A.When a person goes to see a health care provider, and has symptoms of a West Nile illness a specimen may be sent to a commercial laboratory to determine if the person has been infected by West Nile virus. The tests used in commercial labs check for antibodies to the virus (the body's response to infection). The results of the test will be sent to the doctor and the state health department will be informed if the results are positive. There is no specific treatment available for West Nile virus infection, so the diagnosis will not necessarily change the way the person is being treated but it will let the doctor know that he/she does not have to investigate another cause of illness, and it will help the health department know where the virus is active in order to focus prevention measures.

The state health department may choose to accept the positive results from the commercial lab, or they may choose to test the sample again in the state health department laboratory for confirmation of the infection. The state health department will report the case to CDC.

Q.How accurate are the tests used in commercial labs?

A.The tests used in commercial labs are modeled on the tests created by CDC and used at CDC and in state public health laboratories. This is the first year that many of these tests have been widely used in commercial labs, and laboratories are learning more about the specific measurements used in each test. Often, a second test will be done to confirm the infection. State health departments, the FDA (which licenses and regulates medical tools such as these tests), the association of Public Health Laboratories and CDC are all engaged in monitoring new commercial tests, and are committed to working with industry to make these tests as accurate and useful as possible.

Q.If a test is a "false positive" what does that mean?

A.A "false positive" occurs when an initial tests indicates that a person does have a West Nile infection, but a later, more specific tests indicates that the person does not actually have the infection. While it is important to health department and CDC to get an accurate idea of where people are being infected in order to focus prevention and control efforts, the result does not have a great impact on the individual person. There is no specific treatment that the person would receive due to West Nile virus infection. The person may want to work with their physician to see if another cause of the illness needs to be identified.

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