WEST NILE VIRUS

Q: What are West Nile virus, West Nile fever, and West Nile encephalitis?
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 found in the United States. The virus can infect humans, birds, mosquitoes, horses and some other mammals.
West Nile fever is a case of mild disease in people, characterized by flu-like symptoms. West Nile fever typically lasts only a few days and does not appear to cause any long-term health effects.
More severe disease due to a person being infected with this virus can be 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.
Q. Where did West Nile virus come from?
A. West Nile virus has been commonly found in humans and birds and other vertebrates in Africa, Eastern Europe, West Asia, and the Middle East, but until 1999 had not previously been documented in the Western Hemisphere. It is not known from where the U.S. virus originated, but it is most closely related genetically to strains found in the Middle East.
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 over-winter, 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.
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.
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.
Q. What are the symptoms of West Nile virus infection?
A. Most people who are infected with the West Nile virus will not have any type of illness. It is estimated that 20% of the people who become infected will develop West Nile fever: mild symptoms, including fever, headache, and body aches, occasionally with a skin rash on the trunk of the body and swollen lymph glands.
The symptoms of severe infection (West Nile encephalitis or meningitis) include headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, and

paralysis. It is estimated that 1 in 150 persons infected with the West Nile virus will develop a more severe form of disease.

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

A. Usually 3 to 14 days.

Q. How long do symptoms last?

A. Symptoms of mild disease will generally last a few days. Symptoms of severe disease may last several weeks, although neurological effects may be permanent.

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 2002.

Please see CDC's current case count (on the Office of Media Relations page) for the number and nature of human cases of West Nile virus-related disease reported in the U.S. in 2002.

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. 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 persons infected with West Nile virus will develop severe illness.

Q. How do people get infected with West Nile virus (WNV)?

A. The principle 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 finds its way into the mosquito's salivary glands. During subsequent blood meals, the virus may be injected into humans and animals, where it can multiply and possibly cause illness.

Additional routes of infection have become 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. A recent investigation has confirmed WNV transmission through transplanted organs. Investigations of other patients who developed WNV infection within several weeks of receiving blood products or organs are ongoing to determine whether WNV was transmitted by transfusion or transplantation in any of these cases.

There is one reported case of transplacental (mother-to-child) WNV transmission. This case is detailed in MMWR Dec 20, 2002. 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.

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 humans. 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 repellents containing DEET (See Using Repellents Safely) When WNV transmission is occurring in an area, pregnant women who become ill should see their health care provider. Those whose illness is consistent with acute WNV infection (see Symptoms) should undergo appropriate diagnostic testing.

For more details regarding the case described above, please see: MMWR Dec 20, 2002.

Q. Can West Nile virus be transmitted through blood transfusions?

A. Please refer to Blood Transfusions and Transmission: Questions and Answers.

Q. Are laboratory workers in contact with WNV-positive specimens at risk for WNV infection?

A. Yes, and approximately 20 laboratory-acquired WNV infections have been reported in the medical literature over many decades. In the two most recently reported cases, WNV infection of two microbiologists working with WNV-positive samples resulted from percutaneous inoculation (pierced through the skin). Both persons had mild, self-limited illnesses.

As more laboratories are have recently become involved in WNV diagnostic and reference activities, the risk for laboratory acquired WNV infections has probably increased. Laboratory workers handling materials that are potentially infected with WNV should use every precaution to minimize their risk for exposure. For more details, please see: MMWR, Dec 20, 2002.

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.

Q. Can West Nile virus be transmitted through breast milk?
A. Based on a recent case in Michigan, it appears that West Nile virus can be transmitted through breast milk. A new mother in Michigan contracted West Nile virus from a blood transfusion shortly after giving birth. Laboratory analysis showed evidence of West Nile virus in her breast milk. She breastfed her infant, and three weeks later, her baby's blood tested positive for West Nile virus. Because of the infant's minimal outdoor exposure, it is unlikely that infection was acquired from a mosquito. The infant was most likely infected through breast milk. The child is healthy, and does not have symptoms of West Nile virus.

Q. Should I continue breast-feeding if I am symptomatic for West Nile virus?
A. Because the health benefits of breast-feeding are well established, and the risk for West Nile virus transmission through breast-feeding is unknown, the new findings do not suggest a change in breast-feeding recommendations. The American Academy of Pediatricians and the American Academy of Family Physicians recommend that infants be breastfed for a full year of life.
Lactating women who are ill or who are having difficulty breast-feeding for any reason, as always, should consult their physicians.

Q. Should I continue breast-feeding if I am not symptomatic for West Nile virus?
A. Yes. Because the health benefits of breast-feeding are well established, and the risk for West Nile virus transmission through breast-feeding is unknown, the new findings do not suggest a change in breast-feeding recommendations.

Q. If I am breast-feeding, should I be tested for West Nile virus?
A. No. There is no need to be tested just because you are breast-feeding.

Q. Are infants at higher risk than other groups for illness with West Nile virus?
A. No. West Nile virus illnesses in children younger than 1 year old are infrequent. During 1999-2001, no cases in children younger than one year of age were reported to CDC. Of the over 2500 total West Nile Virus cases in 2002, only four were less than one year of age. We know that one of these infants was not breast-feeding, and investigation of the other infants is underway.

Q. If I am breast-feeding, should I use insect repellent containing DEET?

A. Yes. Insect repellents help people reduce their exposure to mosquito bites that may carry potentially serious viruses such as West Nile virus, and allow them to continue to play and work outdoors. There are no reported adverse events following use of repellents containing DEET in pregnant or breast-feeding women. Click here for more information about using repellents safely.

Q. Is West Nile virus (WNV) transmitted by blood transfusion or organ donation?

A. A recent investigation has identified transplanted organs as the source of WNV infection in four recipients of organs from a single donor. How the organ donor became infected is unknown. The organ donor might have become infected from a mosquito bite or possibly acquired the infection through transfusion; an investigation of the numerous transfusions received by the organ donor is ongoing. Since the report of these cases, CDC has been informed of other patients who developed WNV infection within several weeks of receiving blood products or organs. Investigations are ongoing to determine whether WNV was transmitted by transfusion or transplantation in any of these cases.

Q. What is being done about the possibility of transfusion-related WNV transmission?

A. CDC, FDA, blood collection agencies, and state and local health departments are investigating possible cases of WNV transmission through blood transfusion and organ transplantation. For cases currently under investigation, any remaining blood products from donors whose blood was transfused to patients with confirmed or suspected WNV infection have been withdrawn and efforts are underway to contact these donors as well as other recipients of blood products from these donors for follow up.

As part of the investigation, CDC has asked that physicians notify public health authorities of any patients who develop symptoms of WNV infection within 4 weeks of receiving a blood transfusion or organ transplantation. In addition, patients with WNV infection whose symptoms begin in the weeks preceding blood or organ donation should also be reported. Prompt reporting of these persons will help facilitate withdrawal of potentially infected blood components.

Q. Should people avoid donating blood or getting blood transfusions or organ transplants?

A. Blood is lifesaving and is currently in short supply. Donating blood is safe, and we encourage blood donation now and in the future. Approximately 4.5 million persons receive blood or blood products annually. Although persons needing blood transfusions or organ transplants should be aware of the risk for WNV infection, the benefits of receiving needed transfusions or transplants outweigh the potential risk for WNV infection.

Q. How can blood banks avoid collecting blood from donors who may have West Nile virus?

A. On August 17, FDA issued an alert to blood banks and organizations to be vigilant in excluding individuals who may have early symptoms of West Nile virus from donating blood. Most people who have West Nile virus do not show symptoms, making it difficult to defer them from donation. However, some individuals develop minor symptoms of fever and headache. Blood banks need to be vigilant to defer all of those who may have minor illnesses, especially in areas where West Nile virus is most active.

Q. If a person has had West Nile virus, can they still donate blood?

A. With West Nile virus infection, the viremia usually is transient, and people clear the virus very quickly. Blood centers will take precautions (see preceding question and answer) to be sure that donors who have been diagnosed with West Nile virus have fully recovered before donating.

Q. If I recently had a transfusion or transplant, should I be concerned about getting West Nile virus?

A. You should be aware of the potential risk for WNV infection and the need to monitor your health. If you have symptoms of West Nile virus or other concerns you should contact your physician. However, it is important to remember that a large number of WNV infections due to mosquito bites have occurred among persons in the United States this year. By chance alone, some of these persons will have received blood transfusions and/or organ transplantations. Recent receipt of a blood transfusion or organ transplantation by a person with WNV infection does not necessarily implicate the transfusion/transplantation as the source of infection.

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 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.

Source: CDC web page www.cdc.gov accessed on April 9, 2003
Additional information available at http://www.cdc.gov/ncidod/dvbid/westnile/index.htm