

A Few Words about a West Nile Virus

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EDITORIAL

West Nile Virus (WNV) can cause neurological disease and death in people. WNV is commonly found in Africa, Europe, the Middle East, North America and West Asia. WNV is maintained in nature in a cycle involving transmission between birds and mosquitoes. Humans, horses and other mammals can be infected.

On web page of World Health Organisation [1], can be read how approximately 80% of people who are infected will not show any symptoms. West Nile virus is mainly transmitted to people through the bites of infected mosquitoes. The virus can cause severe disease and death in horses. Vaccines are available for use in horses but not yet available for people. Birds are the natural hosts of West Nile virus.

Human infection is most often the result of bites from infected mosquitoes. Mosquitoes become infected when they feed on infected birds, which 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.

The virus may also be transmitted through contact with other infected animals, their blood, or other tissues.

A very small proportion of human infections have occurred through organ transplant, blood transfusions and breast milk. There is one reported case of transplacental (mother-to-child) WNV transmission.

To date, no human-to-human transmission of WNV through casual contact has been documented, and no transmission of WNV to health care workers has been reported when standard infection control precautions have been put in place.

West Nile fever—the leading cause of epidemic viral encephalitis in the USA [2]. Related to JE

(Japanese encephalitis). Symptoms seen in 20–40% of infections. Presentations: a self-limiting febrile illness and arthropathy (very much like dengue), meningitis (especially children), encephalitis (especially adults), flaccid paralysis or mixed. Elderly people are at increased risk of severe disease, including hepatitis, pancreatitis, and myocarditis. Severe neurological disease leads to death in 5% of cases. It is transmitted between Culex mosquitoes and birds, and is the most widespread of the arboviruses (Africa, Europe, Asia, America, the Middle East). While a role for IFN- α and ribavirin has been suggested, there are no controlled trials supporting efficacy and anecdotal evidence of harm with the latter.

West Nile virus is a member of the Japanese encephalitis antigenic complex in the family Flaviviridae, genus Flavivirus [3]. Since the mid-1990s the incidence of West Nile neuroinvasive disease has increased and the geographic range of the virus has expanded significantly. This collection of widely geographically distributed genotypes has facilitated research on the molecular epidemiology and genetic variation of the virus, and important population parameters such as the mutation rate and natural selective forces. Novel insights have been gained regarding the evolution of a mosquito-borne zoonotic virus on a regional and intercontinental scale.

Symptoms

Infection with WNV is either asymptomatic (no symptoms) in around 80% of infected people, or can lead to West Nile fever or severe West Nile disease [1].

About 20% of people who become infected with WNV will develop West Nile fever. Symptoms include fever, headache, tiredness, and body aches, nausea, vomiting, occasionally with a skin rash (on the trunk of the body) and swollen lymph glands.

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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 the age of 50 and some immunocompromised persons (for example, transplant patients) are at the highest risk for getting severely ill when infected with WNV.

The incubation period is usually 3 to 14 days.

Prevention

No specific therapy is available for infection with West Nile virus [4]. In the case of West Nile encephalitis, intensive supportive therapy may be required— such as hospitalization, intravenous fluids, respiratory support (ventilator), prevention of secondary infections (such as pneumonia, urinary tract infections, etc.) and good nursing care.

Efforts to prevent transmission should first focus on personal and community protection against mosquito bites through the use of mosquito nets, personal insect repellent, by wearing light coloured clothing (long-sleeved shirts and trousers) and by avoiding outdoor activity at peak biting times. In addition community programmes should encourage communities to destroy mosquito breeding sites in residential areas.

Gloves and other protective clothing should be worn while handling sick animals or their tissues, and during slaughtering and culling procedures.

Blood and organ donation restrictions and laboratory testing should be considered at the time of the outbreak in the affected areas after assessing the local/regional epidemiological situation.

Health care workers caring for patients with suspected or confirmed WNV infection, or handling specimens from them, should implement standard infection control precautions. Samples taken from people and animals with suspected WNV infection should be handled by trained staff working in suitably equipped laboratories.

Development of New Vaccines Is Need

The health effects of climatic and environmental changes will challenge our nation's already

overburdened public health infrastructure in new ways [5]. Every public health function will be called on, but disaster preparedness and response, disease surveillance, infectious disease control, and vector control will be particularly salient. Whether or not they actually offer evidence of anthropogenic climate change, natural disasters like hurricanes Katrina, Irene, and Sandy, and the emergence of vector-borne diseases like West Nile virus and zoonotic diseases like hantavirus, provide a glimpse of the health hazards that global climate change will bring. The lessons learned are crucial to ongoing adaptation.

Several recent problems highlight the urgent need for the development of new and improved vaccines [6]. These problems include (1) the lack of success of traditional vaccine approaches against 'difficult' organisms, for example HIV and HCV; (2) the emergence of new diseases, for example Ebola, West Nile, and Hanta viruses; (3) the reemergence of 'old' infections, for example TB; (4) the continuing spread of antibiotic-resistant bacteria; and (5) the potential use of microorganisms for bioterrorism. The induction of CTL responses may be necessary for some vaccines, including HIV, but accumulated information shows that induction of potent CTL is difficult with protein-based vaccines.

Development and testing of various methods for treatment and prevention of WNV infection, such as protective vaccines, therapeutic antibodies, antiviral compounds, peptides, and siRNA have been proposed and intensively studied [7]. Although a number of WNV veterinary vaccines have already been licensed and are in use for years, human vaccine candidates are still in various stages of development and testing. Some therapeutic antibodies that show excellent efficacy in small animal models and are currently being tested in clinical trials represent a promising class of WNV therapeutic. Recent technological advancement and increased understanding of the biology of WNV and other flaviviruses along with structural/functional characterization of viral proteins have provided a solid foundation for the development of small molecule inhibitors as future WNV therapeutics. However, efforts for development of an effective drug for prevention or control of WNV infection in human still remain unsuccessful.

Vaccination refers to the introduction of a potentially disease-causing substance into the body to produce immunity to a disease [8]. It

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has been the pinnacle of infectious disease prevention and treatment for the last century. The development of vaccines against many diseases has helped essentially eradicate certain pathogens from the planet, such as the smallpox virus and the poliovirus. However, vaccine development is not easy or simple. A vaccine must be both safe for the person receiving it and effective at conferring immunity to disease. Additionally, financial considerations must be addressed in manufacturing a vaccine. If a vaccine is expected to be used to wipe out a disease among a large population, then huge quantities of the vaccine must be available for a very low cost.

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