

West Nile Virus: A Risk in Texas?

The first cases of West Nile fever the United States were reported in the Northeast in the summer of 1999; over 60 people became ill and 7 died. Although West Nile Virus (WNV) has not yet been detected in Texas, the Texas Department of Health is working with local health departments to promptly detect and control WNV when it occurs in this state. To inform Texas health professionals of the current status of this exotic arboviral disease, TDH has adapted an article published by the New York City Department of Health: City Health Information, May 2001, West Nile virus surveillance and control: an update for healthcare providers in New York City.

Endemic mosquito-borne illnesses have been reported in Texas throughout the 20th century: yellow fever epidemics ending in 1903, dengue in the 1920s through early 1940s and again in the 1980s and 1990s, malaria in the 1940s and 1950s, Venezuelan equine encephalitis (VEE) in 1971, and Saint Louis encephalitis (SLE) in the 1950s and 1990s. Given the confluence of human, mosquito, and bird populations in Texas, WNV will probably reach the state within the year.

In addition to SLE and VEE, other mosquito-borne encephalitides in Texas include Eastern equine encephalitis (EEE), California encephalitis (CE), and Western equine encephalitis (WEE). The alphaviruses that cause EEE, VEE, and WEE are positive-stranded RNA viruses. The flaviviruses that cause SLE and WNV (and their cousins yellow fever and dengue) are also positive-stranded RNA viruses. Antibody tests against the related viruses often cross react. Although encephalitis is not a particularly common disease in Texas, it is a "notifiable" condition, ie, by law it must be reported to TDH.

From 1991 through 2000, an average of 62 cases of encephalitis were reported yearly; for the same years, a far higher number of viral meningitis cases were reported (about 1,200 per year) (Table 1). The vast majority (98%) of the patients with viral meningitis were younger than 65 years of age.

To prepare for the arrival of WNV in Texas, physicians need to be aware of 1) how patients infected with this virus present clinically, 2) the differential diagnosis, 3) available diagnostic laboratory tests, and 4) primary prevention for both their patients and communities (given that the treatment options are limited to supportive therapy).

The clinical pictures for the various encephalitides vary somewhat and are summarized in Table 2. The incubation period for WNV is 5 to 15 days. Of the 70 patients hospitalized with WNV in 1999 and 2000, 63 (90%) had fever; approximately half had weakness, headache, and altered mental status; a fifth, rash; and one tenth, paralysis. Lymphadenopathy, conjunctivitis, abdominal pain, cough, diarrhea, and shortness of breath were also noted in some patients. Neither rash nor lymphadenopathy are usually observed with other causes of arboviral encephalitis in the US. Older patients were most likely to have frank encephalitis with or without paralysis; they were also far more likely than younger patients to succumb. Overall, 10% of the cases were fatal. Because paralysis was so common, a number of patients were initially diagnosed as having Guillain-Barre syndrome.

Recent serosurveys suggest that many nonhospitalized people were infected with WNV but remained asymptomatic or had mild illnesses with flu-like symptoms. An estimated 130 citizens of the Queens borough of New York City were infected for each person under 65 years of age who was hospitalized. Among persons over 65, the ratio of nonhospitalized to hospitalized was 50:1.

Differential Diagnosis

In Texas SLE is by far the most common of the mosquito-borne encephalitides. Following a 4- to 21-day incubation period, patients who become symptomatic may simply have fever and headache, or they may have viral meningitis or encephalitis. Encephalitis may follow a prodrome of fever, headache, chills, anorexia, nausea, and, occasionally, urinary tract symptoms. Ataxia, cranial nerve

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Table 1: Encephalitis and Viral Meningitis in Texas, 1991-2000

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Encephalitis, total	121	89	61	54	71	31	44	38	27	41
Encephalitis, arboviral	42	0	7	2	22	3	1	4	0	2
Viral meningitis, total	1,275	1,242	1,329	970	1,566	927	1,018	1,576	921	1,233
Viral meningitis, \geq 65 yrs	22	28	25	19	29	22	28	22	25	38

palsies, and tremors are frequent. Convulsions may occur, particularly in children. Overall, the case fatality rate is 10%, but it may be as high as 30% in older patients.

The differential diagnosis for febrile patients with acute mental status changes include serious but treatable bacterial and fungal causes of meningitis/encephalitis as well as rarer parasitic causes. Current TDH arbovirus data is at www.tdh.state.tx.us/ideas/track/track.htm. Nonarboviral viruses that should be included in the differential for nontravelers are herpes viruses, rabies, and lymphocytic choriomeningitis.


Although malaria is by far the most common cause of fever, headache, and mental status changes in travelers to developing countries, possible parasitic and viral etiologies of meningitis/encephalitis in travelers are numerous. Physicians caring for such patients are encouraged to consult with a tropical medicine expert. (Standard tropical medicine texts or *A World Guide to Infections* may also be useful for help with the differential diagnosis of meningitis/encephalitis in travelers.)

Diagnostic Laboratory Tests

Laboratory confirmation of WNV is based on any of the following:

Table 2: Symptoms of Various Arboviral Encephalitides

	West Nile	St. Louis Equine	Eastern Equine	Western Equine	California	Venezuelan Equine
Abnormal reflexes		Y	Y	Y		
Anorexia		Y				
Ataxia	Y	Y			Y	Y
Chills		Y	Y	Y		Y
Coma	Y		Y	Y		Y
Confusion	Y	Y	Y	Y		
Conjunctivitis	Y					
Convulsions		Y	Y	Y	Y	Y
Cranial nerve palsies	Y	Y				Y
Cutaneous sensitivity						Y
Drowsiness		Y	Y	Y	Y	
Fever	Y	Y	Y	Y	Y	Y
Headache	Y	Y	Y	Y	Y	Y
Joint/bone pain	Y					Y
Lymphadenopathy	Y					Y
Muscle twitch			Y	Y		
Myalgias	Y					Y
Nausea/vomiting	Y	Y	Y	Y	Y	Y
Paralysis	Y	Y	Y	Y	Y	Y
Rash	Y					
Respiratory symptoms	Y	Y		Y		Y
Retro-orbital pain	Y		Y			
Severe malaise	Y	Y				Y
Stiff neck	Y	Y	Y	Y	Y	Y
Tremor			Y	Y		
Urinary symptoms		Y				
Vertigo				Y		

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- virus isolation from tissue, blood, or CSF or demonstration of antigen or genomic sequence in tissue, blood, or CSF
- IgM antibody to WNV in CSF by enzyme-linked immunosorbent assay (ELISA)
- a 4-fold serial change in plaque reduction neutralization test (PRNT) antibody titer to WNV in paired, acute, and convalescent serum samples taken at least 2 wks apart
- both WNV-specific IgM and IgG antibody in a single serum specimen using ELISA and PRNT testing methods.

In the 1999 and 2000 outbreaks, the IgM ELISA test on CSF was very sensitive (90%) when performed on specimens obtained during the first 8 days of illness and was also very good when performed on serum. However, due to cross-reactivity, positive ELISA tests should be confirmed by PRNT. PCR was far less sensitive than ELISA in the New York outbreak. Because antibody appears to last many months, and often more than a year, **tests (outside a research setting) should be performed only on symptomatic patients.**

Instructions for Lab Submission of Serum and Cerebrospinal Fluid

Houston area physicians are encouraged to submit specimens to the Houston Department of Health and Human Services (HDHHS) Bureau of Laboratories as soon as the test becomes locally available. (Call the HDHHS Bureau of Epidemiology at 713/794-9181 about test availability, specimen submission, and for general WNV information.) HDHHS will accept specimens from

- patients of any age with either encephalitis or a Guillain-Barre type syndrome
- patients over 17 with viral meningitis

Other Texas physicians should forward specimens to TDH for WNV testing from

- patients of any age with either encephalitis or a Guillain-Barre type syndrome
- patients over 65 with viral meningitis

Specimens will not be accepted at TDH from persons who are asymptomatic. Submitted specimens will be tested by ELISA for SLE, dengue, and WNV (IgM and IgG) as well as EEE and WEE (IgG). Positives will be confirmed.

Specimens for virus isolation and serologic testing may be submitted with completed G-1 A and/or B forms to the TDH Laboratory, 1100 W 49th Street, Austin, TX 78756.

Virus isolation. CSF must be placed on dry ice and shipped overnight. Brain tissue should be submitted with prior notification and shipped cold but unfrozen.

Serologic testing. CSF and/or serum may be submitted. Single serum specimens are tested, but paired sera collected 10 to 14 days apart are preferred. (The pairing of sera enables the detection of an antibody titer rise, with a fourfold rise indicating a current infection). Specimens for serologic testing may be shipped at room temperature.

Call the laboratory at 512/458-7515 or 512/458-7592 prior to shipment of any specimens.

Primary Prevention

Health professionals are encouraged to know whether their municipality has a local mosquito control district or control program so that they can reinforce locally recommended mosquito control measures. Importantly, individuals should be advised that most mosquito vectors of encephalitis are home grown (ie, species of interest have a flight range of less than 1 mile). Therefore, the best way for individuals to reduce their risk of mosquito-borne disease is to eliminate mosquito breeding sites near their homes and in their neighborhoods.

Encourage people to

- Empty or get rid of cans, buckets, bottles, old tires, and other containers that hold water.
- Change water in pet dishes, wading pools, and bird baths several times a week.
- Cover trash containers so they will not collect water.
- Repair any leaking plumbing and outside faucets.
- Stock ornamental ponds with fish that eat mosquitoes.
- Keep door, porch, and window screens in good condition to help keep mosquitoes out of the house.
- Avoid mosquito bites while outside by wearing long sleeves and pants.

Repellants with DEET may be useful, but directions must be followed carefully.



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For further information about WNV, see the following Web sites:

Fact sheets for physicians, veterinarians, and the lay public:

www.tdh.state.tx.us/zoonosis/DISEASES/WESTNILE/westnile.asp

Information for physicians on surveillance, prevention, and control:

www.cdc.gov/ncidod/dybid/westnile/index.htm
www.cdc.gov/ncidod/dybid/westnile/links.htm

The full text of the NYCDH City Information article:
www.ci.nyc.ny.us/html/doh/pdf/chi/chi19-1.pdf



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Reporting

To ensure a timely and accurate description of any outbreak that may occur and a rapid public health response, physicians must report encephalitis cases to TDH promptly. Call 800/705-8868 or 800/252-8239.