

West Nile Virus

2006 Case Total 48
2005 Case Total 31

2006 Rate 1.4 per 100,000
2005 Rate 0.9 per 100,000

2006 marked the fifth season of West Nile (WN) virus transmission in Oklahoma and the eighth year of national tracking from its identification in the United States. Since national surveillance began in 1999, there have been a total of 23,974 human cases with 962 deaths reported in the United States with infections reported in animals or people from all 48 contiguous states, Canada and Mexico. In 2006, a total of 4,269 human cases of WN disease and 177 associated deaths were reported to the CDC by 43 states representing a 42% increase in cases from 2005. Nationally, most of the WN virus activity was seen in the northwestern and central mountain states with the highest number of cases being reported from Idaho (996), Texas (354), and Colorado (345).

Consistent with the national trend, Oklahoma also had an increase of WN activity compared to 2005. The state's 2006 incidence of human WN disease was 48 cases of WN Fever or WN neuroinvasive disease resulting in a 55% increase over the previous season. These cases were distributed across 23 counties with geographic clustering in the northwestern and south central regions of the state. Counties with the highest incidence rates per 100,000 population included Roger Mills (29.1), Beaver (17.1), Carter (15.3), Jefferson (14.7), and Woods (11.0). Symptom onsets ranged from June 26 to October 26, 2006. Sixty percent of the case patients were male; median age of all patients was 61 years (range 13-88). Twenty-six of the cases (54.2%) had WN meningoencephalitis or meningitis. There were 6 WN-associated deaths with an overall case fatality rate of 12.5% (6/48); a four-fold increase as compared to the previous season. Prominent symptoms reported for all cases included fever (93.1%), muscle weakness (85.1%), headache (82.6%), altered mental status (52.4%), vertigo (48.9%), vomiting (47.7%), and rash (44.7%). Other common complaints of case patients included tremors, confusion, stiff neck and photophobia. Acute flaccid paralysis was reported in two case patients and Guillain-Barre syndrome was reported in one case patient. Tracking of WN cases for comorbidities as a risk factor is not standardized or available for all cases. However, two case patients suffered from leukemia, three cases had a history of diabetes, and two cases were previous organ transplant recipients. In 2006, 71% of cases were hospitalized (34 of 48). This proportion is 48% greater than that reported in 2005 and suggests that surveillance in 2006 was more likely to capture the more severe clinical presentations of WN disease with an underreporting or under detection of WN fever cases. Only 51% of interviewed cases (21 of 41) reported known exposure to mosquitoes within two weeks of symptom onset.

The 2006 WN season followed the normal pattern of seasonality for human disease in Oklahoma with the first cases being identified in late June to July with peak activity occurring during mid-August. In Oklahoma, WN cases tend to follow a bimodal epidemiologic curve with the primary peak incidence occurring in August

followed by a smaller peak in late September. The last cases of the season frequently have disease onsets during the month of October, or early November.

Since July 2003, blood collection facilities have performed a nucleic acid amplification test (NAT) to screen for WN viremia. All donations from NAT-positive donors are excluded and follow-up testing is performed. These individuals are interviewed further to document WN virus infection and to determine if WN virus-associated symptoms develop. In 2006, 15.4% (2/13) of viremic blood donors developed symptoms of WN disease as compared to 56% (9/16) in 2005.

2007 Surveillance and Laboratory Testing

Throughout the mosquito season, Oklahoma physicians are urged to consider diagnostic testing for WN virus in patients with compatible clinical presentations for either WN fever or WN neuroinvasive disease. Recent medical studies have shown that even patients who have WN fever may experience lasting and prolonged sequelae. In a study of long-term functional outcomes of WN fever cases, many patients commonly reported persistent problems such as fatigue (96%), headaches (71%), and concentration problems (53%).¹

As more WN virus seasons have passed, there is a greater likelihood that Oklahomans have been previously exposed to WN virus; therefore, caution must be used when interpreting WN virus serology. Most commercial laboratories offer both IgM and IgG antibody testing for WN virus. In almost all acute cases of WN disease, the IgM antibody component will be positive along with a positive IgG fraction. If results indicate a negative IgM test with seroreactivity for the IgG fraction only, these results likely represent a patient with prior exposure to WN virus that resulted in an asymptomatic or mild infection. In these cases with only IgG positive results, WN virus is unlikely to be the cause of the patient's recent symptomatology and further evaluation is recommended.

The OSDH Public Health Laboratory (PHL) continues to offer human WN virus testing free of charge. The PHL performs IgM-capture ELISA, the most sensitive screening test for acute infections, on cerebrospinal fluid (CSF) and serum. PCR testing is also available for CSF. Physicians who submit a CSF specimen should also submit a serum specimen (for IgM ELISA) from the case patient due to the lower sensitivity of the PCR test. WN virus resources and testing information can be accessed on-line at <http://www.health.ok.gov/program/cdd/wnv/index.html>.

¹Watson JT et al. *Annals of Internal Medicine*, 2004; 141: 360-365.

**Avian, Equine, and Human West Nile Virus
Surveillance; Oklahoma, 2002-2006**

Case Number				NAT Positive Blood Donors	
Year	Avian	Equine	Human	Blood Donor	Symptomatic
2002	441	965	21	N/A ^	N/A ^
2003	401	169	79	26	1 (4%)
2004	388	32	22	8	1 (13%)
2005	N/A *	32	31	16	9 (56%)
2006	N/A *	2	48	13	2 (15%)

*Collection and testing of wild birds was discontinued.

^Routine blood donor screening began on July 1, 2003.

**Oklahoma Counties with Highest Rates* of
Reported Human WN Disease; 2006 and
Cumulative 2002-2006**

2006		Counties with Highest West Nile Disease Incidence Rates; 2002-2006	
County	Rate	County	2002-2006 Rate
Roger Mills	29.1	Texas	124.3
Beaver	17.1	Beaver	102.4
Carter	15.3	Cimarron	63.5
Jefferson	14.7	Grant	58.3
Woods	11.0	Woods	33.0
Marshall	7.6	Roger Mills	29.3
Pittsburg	6.8	Carter	26.5
Beckham	5.1	Ellis	25.5
Grady	4.4	Okmulgee	17.6
Jackson	3.5	Haskell	16.9
State Total	1.4	State Total	5.8

*Incidence rates per 100,000 population calculated on U.S. Census 2000

Cases of Human West Nile Virus Disease by Week of Onset, Oklahoma 2006

