

## COMING SOON: WEST NILE VIRUS

During 2002, the West Nile virus (WNV), a mosquito-borne pathogen whose major reservoir is birds, spread last year to 44 states, leaving 4,156 confirmed cases of human disease and 284 deaths in its wake. Oregon managed to dodge the bullet, but two infected birds were found in Washington State, and by now the virus may already have arrived here. This issue of the *CD Summary* describes the clinical and epidemiologic features of WNV infection and outlines our recommendations for dealing with it when it arrives.

### EPIDEMIOLOGY

Through June 2003, WNV has been detected in dead birds of at least 138 species, but members of the corvid family (crows, jays, and magpies) are thought to be the chief reservoir. WNV is transmitted among birds and to mammals, including human beings, through the bites of infected mosquitoes. Mosquitoes become infected by feeding on viremic birds. Although several species of *Aedes* mosquitoes are susceptible to infection and appear able to transmit the virus, most virus isolations have been from *Culex* spp.,<sup>1</sup> which are prevalent throughout Oregon. Competent avian hosts will sustain an infectious viremia for 1 to 4 days after exposure, allowing ample time for a mosquito to bite and transmit the virus to another unsuspecting fowl. The virus can spread as fast and far as infected birds can fly. In 2002, WNV was identified in 44 states (figure, below). This year, WNV re-emerged along with the mosquitoes: as

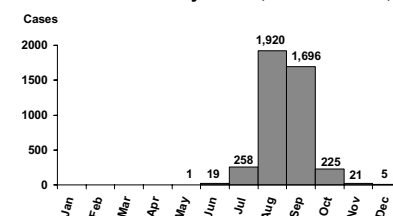
West Nile Virus in the United States, 2002



Orange indicates verified avian, animal, or mosquito infections during 2002  
Brown indicates human cases

this issue goes to press, it has already been sighted in 34 states, and it appears ready to resume its westward march in the US. No human cases have yet been reported this year. In past years, cases have tended to peak in late August and early September (figure, below).<sup>2</sup>

West Nile Infection by month, United States, 2002



Infection has been found in many mammalian species, but they are not known to develop infectious-level viremias, and for that reason they are probably “dead-end” or incidental hosts. Therefore, there is no reason to destroy an animal infected with WNV. Similarly, the virus does not appear to be transmitted from person to person. Exceptions that prove this rule were documented last year.

During 2002, blood products were identified as the source of infection for 23 people who received transfusions of blood taken from 16 donors. Most of these donors were not sick when they donated blood. Also last year, transplanted organs were identified as a means of infection after four patients who received organs from a single donor developed WNV illnesses. Three of these organ recipients developed encephalitis; one died. The fourth person developed fever and recovered. The organ donor had been infected through blood transfusion.

The federal Food and Drug Administration has issued guidance for deferral of donors with suspect or diagnosed WNV infection—either before or after donation. The document also provides recommendations for retrieval and

quarantine of blood and blood components from these donors.<sup>3</sup> Beginning this month, all blood products will be screened for WNV by amplification.

### CLINICAL FEATURES

Most people with WNV will have either no symptoms or only mild ones. A serosurvey conducted in 459 households near the epicenter of the 1999 outbreak in Queens, New York, found that 2.6% of residents had been infected, but only about 1 in 5 infected persons developed a febrile illness.<sup>4</sup> Symptoms begin 3–14 days after the bite of an infected mosquito and, along with fever, may include headache and myalgias, and occasionally skin rash and swollen lymph glands. Only about 1 of every 150 infected persons develops meningoencephalitis, marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, and convulsions. In such cases, the CSF almost always shows pleocytosis and elevated CSF protein.<sup>2</sup> Meningoencephalitis is much more common in persons  $\geq 50$  years of age.

Acute WNV infection can rarely cause acute flaccid paralysis (AFP), which is attributed to a polio-like syndrome with asymmetric involvement of the anterior horn cells of the spinal cord and motor axons.<sup>5</sup> Clinicians should evaluate patients with AFP for evidence of WNV infection; it may generally be distinguished from Guillain-Barré syndrome by its asymmetry, lack of sensory deficit, and CSF pleocytosis.<sup>5</sup>

Treatment is supportive. Interferon  $\alpha$ -2b has been shown to inhibit the toxicity of WNV to Vero cells *in vitro*,<sup>6</sup> but trials in human beings have not been published.

### SURVEILLANCE IN OREGON

Since 2001, we have been looking diligently for WNV in Oregon. Mosquitoes are collected by vector-control districts (VCDs) throughout the state and tested (in pools of 20–50 of the



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same species) by polymerase chain reaction (PCR) at OSPHL. Sera from sentinel chicken flocks (6–10 birds per coop) are collected by VCDs and tested for anti-WNV antibodies at the Oregon State Public Health Laboratory (OSPHL). Birds that die in groups of at least two may be sent to Oregon State University's Veterinary Diagnostics Laboratory for

- To avoid helping mosquitoes breed in your environment, drain standing water. Routinely empty water from flower pots, pet bowls, clogged rain gutters, swimming pool covers, discarded tires, buckets, barrels, cans, and other items that collect water in which mosquitoes can lay eggs.

- 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.

**DIAGNOSIS AND REPORTING**

Oregon law requires reporting of WNV and other arthropod-vectorborne infections to local public health officials within 1 working day, and we are interested in receiving reports of any human encephalitis of unknown etiology. OSPHL can test serum and CSF for WNV, along with St. Louis and Western Equine encephalitis viruses; it can also send specimens to CDC to test for more exotic arboviruses.

For more information, see <http://www.healthoregon.org/acd/wnile/index.cfm> or <http://www.cdc.gov/ncidod/dvbid/westnile/index.htm>.

**REFERENCES**

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Specimens tested for West Nile virus, Oregon, 2001-2003				
Specimen	Method	2001	2002	2003
Mosquito Pools	PCR	207	326	79
Chicken sera	EIA for IgM	310	279	52
Dead birds	PCR	0	65	34
Human patients	EIA for total Ab	0	28	10

testing by PCR. Finally, OSPHL tests sera and CSF from suspected human cases for antibodies to WNV. Numbers of the various tests conducted to date are shown in the table; the lone positive test was in a Michigan resident who became ill in her home state and then traveled to Oregon where she was admitted to the hospital with encephalitis.

**PREVENTION**

Given its arrival late last year in Washington birds, we predict that WNV will reach Oregon this summer. Remember that the best ways to prevent exposure are 1) to deny mosquitoes their breeding sites, particularly in populated areas; and 2) to keep them from biting human beings. Vector-control officials have planned carefully to reduce breeding sites using larvicides already approved by the Oregon Departments of Agriculture and Fish & Wildlife. CDC recommends that the rest of us do the following:

- Apply insect repellent sparingly to exposed skin. The more DEET (*N,N*-diethyl-*m*-toluamide) a repellent contains, the longer time it can protect you from mosquito bites.
- 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.
- Spray clothing with repellents containing permethrin or DEET since mosquitoes may bite through thin clothing. Do not apply repellents containing permethrin directly to exposed skin. If you spray your clothing, there is no need to spray repellent containing DEET on the skin under your clothing.
- When possible, wear long-sleeved shirts and long pants whenever you are outdoors.