

West Nile Virus: Background

- **First isolated in West Nile district, Uganda, 1937**
 - From febrile human
- **Geographic distribution**
 - Africa, Middle East, Europe, West/Central Asia
 - (and now) North America
- **Basic transmission cycle: mosquitoes-birds**
 - Birds without apparent illness (until now)
- **Humans / horses usually “dead-end” hosts**



West Nile Virus: Epidemics/Epizootics

- | | | |
|-----------------|-----------------|---------------|
| • Israel | 1951-1954, 1957 | |
| • France | 1962 | |
| • South Africa | 1974 | |
| • North Africa | 1994, 1996 | |
| • Romania | 1996 | |
| • Italy | 1997 | (Horses only) |
| • Russia | 1999 | |
| • United States | 1999-2000 | |
| • Israel | 2000 | |
| • France | 2000 | (Horses only) |



West Nile Virus: Clinical Features

- Most human infections “silent”
- Clinical illness in minority of infections
 - Incubation period 3-15 days
- Classic form: “West Nile fever”
 - Self-limited, dengue-like illness
 - Fever, headache, rash, lymphadenopathy
- Severe clinical forms (<1% of infections)
 - Encephalitis
 - More common in persons >50 years old
 - Case-fatality ~10%
 - Meningitis
 - Rarest: hepatitis, pancreatitis, myocarditis



West Nile Virus in North America: Possible Mechanisms of Introduction

- Viremic human
- Human-transported viremic bird (or other vertebrate)
 - Legal
 - Illegal
- Storm-transported viremic bird
- Human-transported infected vector(s)
- Purposeful introduction (bioterrorist event)



West Nile Virus in North America CDC's Role and Response

- Consultation (surveillance/epidemiology, prevention/control, laboratory)
- Field investigation support (epidemiology, entomology, vertebrate biology, biostatistics, data management)
- Laboratory support (diagnostic/reference)
- Reagent production and dissemination
- Technology transfer
- Applied research
- Organizational leadership
- Distribution of emergency funds for surveillance and control



West Nile Virus in North America Summary 1999-2000 (1)

- Widespread bird involvement: 135 counties, 12 states, District of Columbia
 - >4000 infected birds, >75 species
- Dead birds:
 - Useful for monitoring geographic distribution
 - Density may help predict human risk
 - Natural selection may soon limit usefulness
- Equine disease: 88 cases, 7 states
- 7 other non-human mammal species infected
- Urban *Culex pipiens* primary enzootic vector
- Many other mosquito species infected but vector status uncertain; some (e.g., *Cx. salinarius*) may “bridge” between birds and mammals





Host-Preference Patterns of WNV-positive Species

Ornithophilic

Cx. pipiens

Cx. restuans

Cs. melanura

Mixed

Cx. salinarius

Opportunistic/Mammal

Ae. canadensis

Ae. cantator

Ae. triseriatus

Ae. trivittatus

Ae. albopictus

Ae. vexans

Ae. atropalpus

Ae. japonicus

Ps. ferox

An. punctipennis

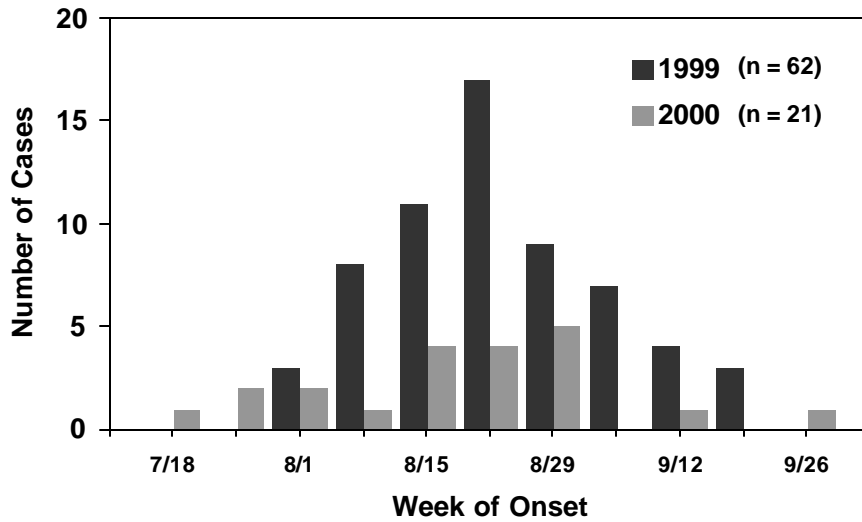


West Nile Virus in North America Summary 1999-2000 (2)

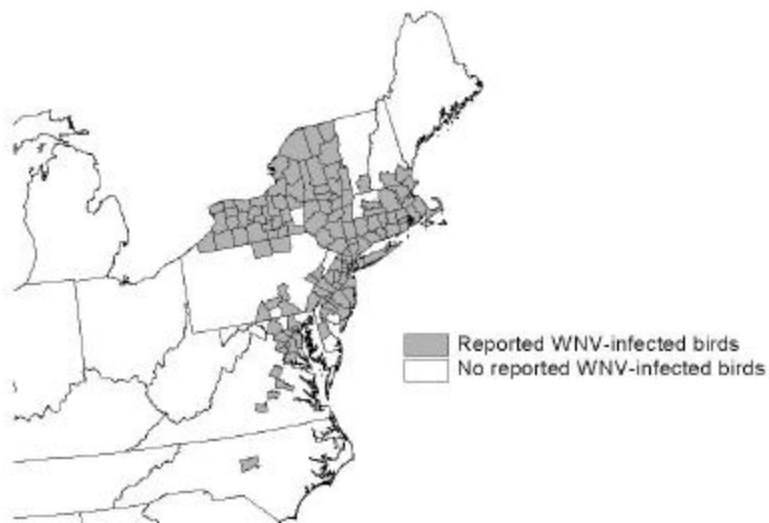
- 83 human cases
- All from greater NYC metro area: NY (76), NJ (6), CT (1)
- 79 with neurologic illness
- 9 deaths (11%)
- Median age = 69 yr (range, 5-95 yr)
- 85% \geq 50 yr old
- In 2000, few human infections despite intense virus activity in birds and mosquitoes, reasons unknown (Staten Island and Suffolk County, NY; Fairfield County, CT)



West Nile Virus, United States: Dates of Onset, Human Cases, 1999-2000



West Nile Virus-infected Birds, 2000



West Nile Virus: North American Transmission Cycle

Enzootic (Maintenance/Amplification)

