The West Nile Virus: An Environmental Perspective

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PEHSU Program Disclaimer

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What is West Nile

• *arbovirus*” - derived from phrase “arthropod-borne.”

• Infests birds, humans, other vertebrates (Africa, E. Europe, W. Asia, Middle East.)

• Crosses the blood brain barrier

• Closely related to St. Louis encephalitis virus found in US.
West Nile Virus

- Wild and domestic birds - primary host.
- Spreads from birds to man and other animals via mosquitoes feeding on an infected bird and then biting another host.
- Mosquitoes that transmit WNV and SLE usually prefer to bite birds.
- Human infections with these mosquito-borne viruses are very rare and can be prevented by taking simple measures to avoid mosquito bites.
Incidental hosts
Humans, horses, and other animals

Amplifying hosts

Vectors
*Culex* spp., *Aedes* spp., *Ochlerotatus* spp.
Mosquito Vectors

Nearly 60 (59) species of mosquitoes capable (at least in the lab) of transmitting WNV

- Culex tarsalis (western states)
- Culex pipiens (Midwest, and elsewhere)
- Culex quinquefasciatus (south)

- Important vectors vary by geography, e.g.
- Different behaviors – some fly very long distances
- Feeding habits, infection rates, breeding areas all important

Culex tarsalis feeding
Human Transmission

- Direct contact
  - Infected birds, tissues
- Laboratory acquired
- Blood transfusions
  - Screening implemented in 2003
- Organ transplants
- Trans placental transmission
- Breast feeding
Disease in Humans

- Incubation: 2 to 14 days
- Many WNV infections asymptomatic
- Two forms of disease
- **West Nile fever**
  - Most common form
  - Resembles influenza
  - Most infections resolve in 2 to 6 days
  - Persistent fatigue can occur
Disease in Humans

- **West Nile neuroinvasive disease**
  - Occurs rarely
    - Progression of West Nile fever
    - Can be severe and life-threatening
    - Three syndromes
      - Encephalitis
      - Meningitis
      - Acute flaccid paralysis
    - Persistent neurological dysfunction may occur
WNV Human Infection “Iceberg”

- Asymptomatic: ~80%
- “West Nile Fever”: ~20%
- CNS disease: <1%
- Very crude estimates

For every case of illness involving the brain or spinal cord, ~150 total infections

~10% fatal (~0.1% of total infections)
Diagnosis and Treatment

- Serology – Antibody Testing
- Supportive Care
- Level dependent on severity of disease
- Vaccine available for veterinary purposes only at this time
The Four Ds of WNV Prevention

- **Dusk to Dawn** – Those are the prime mosquito feeding hours and that is when they are most likely to take a drink Out of you.

- **Dress** – Wear long sleeves and long pants to avoid being bit.

- **DEET** – Buy an insect repellant that contains DEET and be sure to follow the manufacturer’s instructions.

- **Drainage** – Make sure flower pots, water dishes, bird Baths and children's swimming pools are properly drained so they're not breeding grounds for mosquitoes.
Environmental Concerns of Control

• Aerial Spraying
  – Research shows it is effective, Dallas reports a cutting of Culex by 93% since spraying.

• Potential Downfalls
  - Killing off insects important to environmental homeostasis (bees, butterflies, etc)
  - Human exposure to pesticides
  - Drift leading to items such as water contamination
  - Insecticide resistance
Where to Obtain Up to Date Info

http://www.dshs.state.tx.us/idcu/disease/arboviral/westnile/

<table>
<thead>
<tr>
<th>Sample Type</th>
<th>Cases</th>
<th>Counties</th>
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<tbody>
<tr>
<td>Human WNF</td>
<td>882</td>
<td>91</td>
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<tr>
<td>Human WNND</td>
<td>752</td>
<td>93</td>
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<td><strong>Total Human Illness</strong></td>
<td><strong>1634</strong></td>
<td><strong>120</strong></td>
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<tr>
<td>Bird</td>
<td>206</td>
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<td>Horse</td>
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<td>51</td>
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<td>Viral Activity</td>
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74 West Nile human fatalities have been reported in 2012
2 West Nile human fatalities have been reported in 2011.
7 West Nile human fatalities have been reported in 2010.
9 West Nile human fatalities have been reported in 2009.
1 West Nile human fatalities have been reported in 2008.
17 West Nile human fatalities have been reported in 2007.
* West Nile Virus may be found in multiple sources in the same county.
A major source of West Nile horse data is the Texas Veterinary Medical Diagnostic Laboratory.

More Annual Summaries may be found on the statistics page.
References


Texas Department of Public Safety Texas Division of Emergency Management (2012). State Situation Report. 08/09/2012