

# Conference Summary

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# Epidemiology

- Westward spread, but persistent activity in established regions.
- Males have higher WN neuroinvasive disease incidence than females.
- Viremic blood donors: ~30% WN fever, ~1.5% WN neuroinvasive disease.
- Transplant recipients: approximately 40% risk neuroinvasive disease.
- Predictions of future outbreak locations often wrong.

# Surveillance

- Dead bird surveillance may identify focal areas of higher human risk (New York).
  - Still useful for early detection measure in new areas (CA).
  - Utility may vary geographically and over time.
  - Species of dead birds vary geographically (sparrows in AZ versus jays in Texas versus crows in Northeast).
  - Long term utility of dead bird surveillance uncertain.
- Underreporting of human clinical cases: ~10% of clinical cases reported (WN fever underreported) (Arizona)
- Underreporting of human deaths.

# Clinical Impact

- WNF: may not be so “mild”
- Rash: more common in WN fever patients (~65%). Negative correlation with disease severity.
- Neuroinvasive disease
  - Early intubation/hypoxia/decreased gag reflex were bad prognostic indicators.
  - Deaths due to respiratory failure. May occur months after illness onset.
  - Paralysis syndrome: variable but limited recovery, especially after 3 or 4 months post-onset.

# Ecology

- *Cx. pipiens* in north, *Cx. quinquefasciatus* in south, *Cx. tarsalis* in west
  - Confusing picture: overlapping species distributions, variability in vector competence by year and location, role of other species unclear (some very competent)
- Impact on wildlife unclear
  - Big population decreases in some avian species in some areas (crows, owls, sage grouse).

# New Treatments/Vaccines

- WNV vaccine
  - 2 licensed vaccines for horses
    - Nearly all horse cases (California) unvaccinated or improperly vaccinated.
  - Variety of vaccines under development: Chimeras (YF and DEN 4 backbones), DNA vaccines, live attenuated....
  - Phase one human clinical trial (YF/WN chimera)
- 3 randomized clinical trials: Israeli IVIG, IFN, 3<sup>rd</sup> generation anti-sense compound
  - Low enrollment
  - System not set up for emerging diseases: IRB, patients present at community hospitals, insurance,....

# Diagnostics/Virology

- Microsphere-based immunologic assay (Luminex): 4-hour IgM assay, multiplex
- Blood donor screening:
  - Nucleic acid amplification (NAT) tests (MP/ID).
  - >1% yield in some epidemic areas
  - Very early infection: low viremia below MP NAT detection threshold problematic (<1 day duration)
    - Need for triggers to switch from MP to ID NAT
  - Late infection: prolonged (weeks) low level viremia with IgM antibody. Infectiousness?

# Virology

- Very little genetic evolution (max divergence ~0.35% from NY99 prototype)
  - Eastern US 99-02
  - N. America 01-04
  - SE Coast TX 02 (died out)
  - Other strains (bird in Mexico) apparently come and go. May differ phenotypically. Caution when trying to correlate epidemiological patterns with virulence characteristics.

# Prevention

## ■ WNV vaccine

- 2 licensed vaccines for horses
- Variety of animal and human vaccines under development: Chimeras (YF and DEN 4 backbones), DNA vaccines, live attenuated....
- Phase one human clinical trial (YF/WN chimera)

# Prevention

- Knowledge ≠ behavior change
  - Transplant patients: high knowledge, low action.
  - Relatively constant level of practiced prevention behavior nationwide 02-04 (about half took some prevention measure)
  - Varies by region of country – West Coast low
  - Repellent use low (20% in LA County) although awareness high
- Social marketing measures needed
  - Product/price/place/promotion
  - Beware of competing and contradictory messages
- Wider spectrum of effective repellents available
  - More choice, but more complex communication messages

# Mosquito Control

- Integrated mosquito control
- Insecticide resistance
  - Limited choices of pesticides
  - Difficult to measure
    - Difficult to interpret results
    - Need standards for pyrethroid resistance
- Need to monitor results of control efforts
  - Sentinel chickens, mosquitoes, dead birds, human cases
  - Difficult to prove efficacy on human health (change in human epi curves versus different incidences in comparison areas)
  - Post-adulticiding: 10 times reduction in Culex counts, decreases in mosquito pools, human cases, positive blood donations in CO
- Lack of health effects from adulticiding (California).  
Need for proactive communication message.

# Mosquito Control

- Strains on mosquito control program
  - Mesa County: \$3K to \$500K in 5 years
  - Maricopa County: 60K acres in 2003; 1.5 million acres in 2004.
  - New problems: “green pools” in Arizona