Eastern Equine Encephalitis in Michigan--2010

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Historic Distribution of EEE
United States

- Alphavirus
- First identified in 1930's
- East coast, Gulf coast, Great Lakes

EEE Human Neuroinvasive disease, 1964-2008

EEE in Humans

- Incubation period 4-10 days
  - Fever, h/a, malaise, arthralgia, myalgia
  - Systemic signs plus mental status changes, v/d, seizures, coma
- Persons >50 yrs and <15 yrs are at increased risk for serious disease
- An estimated 1/3 of ill patients die, survivors can have mild to severe neurologic sequelae.
- Survivors likely have lifelong immunity

Deresiewicz, RL, et al; N ENGL J MED 1997; 336:1867-1874
EEE in Horses

- Fever, depression, listlessness
- Progress to neurologic signs such as stumbling, circling, head pressing
- Often leads to coma and death or euthanasia due to severity of illness
- Fatal in 90% of ill horses

EEE in Wildlife

- Wild birds are natural reservoir; can cause mortalities in birds
- Emus are uniquely sensitive
- Rare documented mortality attributed to EEE in white-tailed deer;
  - Georgia (2001) – a single deer
  - Wisconsin (2004) – a single deer
  - Michigan
    - 2005 (Kent, Ionia, Montcalm) – seven deer
    - 2009 (Branch) – a single deer, (also mortalities on emu farms in Oakland and Schoolcraft counties)
    - 2010 (Livingston, Missaukee) – two deer

Transmission Cycle

EEE in the salivary glands of a mosquito

Mosquito Vector

Avian Host/Reservoir

EEE

Enzootic Cycle

Incidental Infection

Bridge Vector

“Dead End” Hosts
Ecology of EEE

- Primary vector is the *Culiseta melanura* mosquito
  - Prevalent in fresh water hardwood swamps
  - Bite birds almost exclusively
  - Short flight range (1 km)
- Virus reservoir is birds (develop high viremia)
  - The natural cycle of EEE in Michigan has not been elucidated (overwintering in mosquito larvae or reservoir species, reintroduction by migrating birds, ???)
- Bridge vectors include *Aedes* (floodwater mosquitoes), *Coquillettidia*, and *Culex* sp.
  - Bite birds and mammals
  - Longer flight range

History of EEE in Michigan

- Considered endemic in the state
- Equine, human and wildlife cases identified sporadically
- Outbreaks occur every decade or so
- Historically large equine outbreak in 1980-1981
- EEE “zone” from southwest lower Michigan, extending northeast into the “thumb”

Michigan Geologic Features associated with EEE Equine cases, 1980-1995

Glacial history (A), soil type (B), and bedrock geology (C) determine the optimum habitat for the vectors and hosts of EEE virus.
Confirmed Equine EEE Cases, 2010

- Alabama: 8
- Florida: 93
- Georgia: 11
- Iowa: 1
- Indiana: 10
- Massachusetts: 4
- Michigan: 56
- Mississippi: 20
- New Hampshire: 1
- New Jersey: 1
- New York: 10
- North Carolina: 6
- Ohio: 4
- South Carolina: 2
- Texas: 1
- Virginia: 1
- Wisconsin: 1

Total = 230

EEE Equine, Suspect and Confirmed—2010

Human, Equine, and Cervid Epi-Curve: Michigan, 2010

Reported Cases of EEE in Michigan 2010

- Confirmed Human
- Suspect Horse
- Confirmed Horse
- Confirmed Deer

MMWR Week

- July
- August
- September
- October
Human EEE Cases, 2010

Total = 10

- Florida 4
- Massachusetts 1
- Michigan 1
- New York 2
- Rhode Island 1

2010 MI Human Cases

- 3 Cases
- 2 Male, 1 Female
- Age range: 41y-61y
- Average Age: 51 y
- Onset dates: July 12-August 3
- All experienced meningoencephalitis
- All three patients discharged to rehabilitation hospitals
Laboratory Testing: Human

- CDC and MDCH offer an EIA test for EEE, not available through commercial labs
- IFA is methodology utilized by commercial laboratories offering EEE serology
- Less sensitive than EIA
- MDCH asked hospitals to submit CSF on patients with suspect viral meningitis/encephalitis for arbovirus testing, particularly if the IFA IgM was negative or not performed, but IgG was positive.

Serologic Testing: 2010 Human Cases

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2011 Michigan EEE Surveillance Plans

- May-July: conduct targeted mosquito surveillance in select EEE endemic counties
  - MSU and Summer Student
  - MI Mosquito Control Districts
- May-October: conduct active surveillance for equine EEE cases with veterinarians and human EEE cases with hospitals
- Press Release for first EEE positive mosquito, equine or human identified
- Weekly updates of surveillance data on the Emerging Diseases website throughout the season
Prevention in Humans

- Avoid mosquito bites when outdoors in the summer months, particularly at dusk and dawn
  - Use insect repellent
  - Cover exposed skin
- Keep windows and screens in good repair
- Community Integrated Mosquito Management
  - Monitor mosquito populations
  - Conduct larvaciding
  - Utilize targeted adulticiding based on presence of vector mosquito populations

Prevention in Horses

- Vaccinate!
- Stable horses indoors from dusk to dawn
- Remove/reduce standing water around barns and pastures
- Use of mosquito screening and fans in barns can reduce risk
- Discuss use of insect repellents with your veterinarian

Michigan Resources

- Emerging Diseases Website

www.michigan.gov/emergingdiseases
National Surveillance Data

- www.cdc.gov/
- Epi-X: CDC Arboviral Activity Update
  - All arboviruses
  - Updated weekly

Questions?

Courtesy: NorthEscambia.com