DIAGNOSIS OF WEST NILE VIRUS INFECTION IN ANIMALS

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WNV Surveillance in Dead Corvids

- Blue jay
- Common raven
- American crow
Reporting Dead Corvids

- complete the form at www.michigan.gov/westnilevirus/
- if we want to test the bird for WNV, you will be instructed to contact your local health department
- submission kits are available at the LHD and other agencies
Submission of Dead Corvids to DCPAH
Submission of Dead Corvids to DCPAH

- birds that appear recently dead, with little evidence of decay (i.e., maggots, noxious odor)
- handle birds with disposable rubber/latex gloves
- submission kits provided by MDCH to LHDs and other participating agencies
Testing of Dead Corvids at DCPAH

- collection of heart and kidney tissues
- immunohistochemistry (IHC) for WNV antigen
- PCR confirmation of IHC-positive birds
- testing birds from a given ZIP CODE until one positive bird is confirmed
Positive IHC Reactions in Corvids

heart

kidney
Confirmation of IHC-positive Corvids by RT-PCR

lanes 1-8: positive
lane 9: negative
lane 11: positive control
lane 13: negative control
Dead Corvid Data Collection

- timely updating of data at website
- mapping positive birds by zip code
- determining dead corvid density (per square mile)
- determining changes in dead corvid density over time (weekly)
Mapping of Positive Birds - 2001

2001 WEST NILE VIRUS SURVEY RESULTS

- **WEST NILE VIRUS POSITIVE BIRDS**
- **WEST NILE VIRUS INFECTED COUNTY**
- **COUNTY LINE**

Map showing infected counties in Michigan.
Significance of Dead Corvid Data

- forecast of human WNV risk
- New York study (2000):
  - no human cases in counties with low weekly dead crow densities (< 0.1 per square mile)
  - occasional human cases within a few weeks after counties reported moderate dead crow densities (0.1-1.5 per square mile)
  - outbreak of human cases 2 weeks later in the only county with high dead crow density (>1.5 per square mile)
Significance of Dead Corvid Data

- CDC study (2001 and 2002)
  - calculated relative risk (RR) of human cases in relation to when the first positive bird case was reported
  - The end of week 31 (August 5 or 4) was the pivotal date
  - in 2001, RR = 6.43
  - in 2002, RR = 2.37
Early Avian Deaths Predict Human Illness: North Central U.S., 2002

Avian cases before Wk 32 (8/4)

Avian cases Wk 32 or later

Human cases

RR = 1.77

USGS
WNV Diagnosis in Live Horses

- submission of serum and/or CSF to DCPAH
- completion of “Equine Arbovirus Encephalitis” submittal form
Serologic Diagnosis in Live Equine Suspects: IgM Capture ELISA

- control
+ control
Other Testing of Live Equine Suspects

- **IgG ELISA**
  - screening test for previous exposure to WNV
  - previously vaccinated or natural exposure

- **virus neutralization (VN) test**
  - determines viral neutralizing antibody titer
WNV Diagnosis in Dead Horses

- submission of heads or whole bodies to DCPAH for necropsy
- MDA will arrange for transportation, if necessary
Testing of Dead Horses

- gross necropsy
- rabies testing at MDCH
- CNS histopathology
- IgM capture ELISA on CSF
- IHC for EEE, but not for WNV
- PCR and/or virus isolation
Pathology of WNV Infection in Horses

- encephalitis and/or myelitis, meningitis
WNV Diagnosis in Dead Non-corvid Birds

- gross necropsy
- histopathology of all major organs
- IHC on heart, kidney, brain
- confirmation by PCR
Histopathologic and IHC Findings in Non-corvid Birds

- inflammation and viral antigen in multiple organs

- encephalitis

- myocarditis

IHC, brain
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<th>WNV Infection in Other Animals</th>
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<tbody>
<tr>
<td>dogs</td>
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WNV Diagnosis in Other Animals

- **live animals:**
  - IgM capture ELISA for dogs
  - IgG ELISA for dogs
  - VN test on serum from any species

- **dead animals:**
  - gross necropsy
  - histopathology of all major organs
  - IHC on nervous tissue
  - confirmation by PCR