West Nile Virus Infections in Europe

Orsolya Kutasi

Szent Istvan University, FVSc, Equine Clinic, Hungary
The West Nile Virus (WNV)

Flaviviridae – Flavivirus - Japanese encephalitis serocomplex

Lineage 1
- widespread
- highly pathogenic, neuroinvasive

Lineage 2
- Sub-Saharan Africa and Madagascar
- Europe
- neuroinvasive strains
Transmission cycle

The Carrier

The Virus

Incidental hosts

Amplifier, Reservoir, Distributor
WNV infections

- asymptomatic
- Hu: WNV fever
- Hu: 1% neurological disease, polioencephalomyelitis
  Eq: 10%

Clinical manifestation:

- strain
- individual factors
- presence of antibodies against other flaviviruses
Clinical signs

- non-specific signs
  - general depression
  - loss of appetite
  - low-grade fever
  - colic-like symptoms
  - lameness, stiffness
  - poor performance
Clinical signs

<table>
<thead>
<tr>
<th>Clinical manifestation</th>
<th>% of horses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weakness</strong> (forelimb?)</td>
<td>78</td>
</tr>
<tr>
<td><strong>Ataxia</strong> (forelimb?)</td>
<td>72</td>
</tr>
<tr>
<td>Muscle fasciculations</td>
<td>39</td>
</tr>
<tr>
<td>Recumbency</td>
<td>39</td>
</tr>
<tr>
<td>Hyperesthesia</td>
<td>28</td>
</tr>
<tr>
<td>Cranial nerve deficit</td>
<td>28</td>
</tr>
<tr>
<td>Asymmetric gait</td>
<td>22</td>
</tr>
<tr>
<td>Behavioural abnormality</td>
<td>17</td>
</tr>
</tbody>
</table>
Clinical signs
Clinical signs
Laboratory parameters

- **Haematology**: +/- increased white blood cell count & neutrophilia

- **Metabolic profiles**: non diagnostic

- **Cerebrospinal fluid**: high protein +/- pleocytosis with lymphocytes or neutrophils
WNV outbreaks

- between August and November
- horses showing neurological symptoms
- diagnosis based on
  - epidemiology
  - clinical signs
  - serology

- postmortem: histopathology, PCR, virus isolation
Serology

- IgM ELISA
- IgG ELISA
- PRNT
- extensive cross-reactive antibody response to other Flaviviruses (molecular tests)
- urine?
Diagnostics

- **CNS signs**
- **IgM ab**
- **IgG ab**

- **Viraemia**
- **Infection**
- **Onset of fever**
- **Disease 3-7 days**
- **2-4 months**
- **> 1 year**

- **Viral RNA**
Differential Diagnosis

- Wobblor-syndrome (CVM)
- Trauma
- Equine Herpesvirus Encephylomyelitis
- Rabies, Borna
- Parasitic migration
- Bacterial meningitis
- Degenerative myeloencephalopathia
- Botulism
- Tick-borne encephalitis
- Other myelo/encephalopathies
IgM Elisa positivity is not a diagnosis!

Scenario:

- 13 years old pony
- Neurological signs started in April
- Progressive ataxia, dysphagia, pharyngeal, laryngeal paralysis
- IgM Elisa positive in July
- Vaccinated 2 years ago?
Un cas de fièvre de West Nile - Komaron-Esztergom - Hongrie

jeudi 6 Août 2015

Un cas de fièvre de West Nile - Komaron-Esztergom - Hongrie

<table>
<thead>
<tr>
<th>Maladie</th>
<th>fièvre de West Nile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nombre de prélèvement(s)</td>
<td>1</td>
</tr>
<tr>
<td>Date de confirmation</td>
<td>04/07/2015</td>
</tr>
<tr>
<td>Symptômes</td>
<td>syndrome neurologique</td>
</tr>
<tr>
<td>Nombre de chevaux affectés</td>
<td>1</td>
</tr>
<tr>
<td>Effectif total</td>
<td>26</td>
</tr>
<tr>
<td>Mesure(s) de contrôle</td>
<td>dépistage</td>
</tr>
</tbody>
</table>

Source : International Collating Center (GB)
Outcome

- 30% died, 70% recovered, 30% residual CNS signs
## Serosurvey

<table>
<thead>
<tr>
<th></th>
<th>Number of premises</th>
<th>Tested</th>
<th>Positive</th>
<th>Showing clinical signs</th>
<th>Dead</th>
<th>% of positive animals</th>
<th>% positive animals showing clinical signs</th>
<th>Case-fatality rate %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affected premises</td>
<td>15</td>
<td>105</td>
<td>47</td>
<td>18</td>
<td>5</td>
<td>44,7</td>
<td>38,3</td>
<td>27,8</td>
</tr>
<tr>
<td>Non-affected premises</td>
<td>3</td>
<td>184</td>
<td>45</td>
<td>0</td>
<td>0</td>
<td>24,4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>289</td>
<td>92</td>
<td>18</td>
<td>5</td>
<td>31,8</td>
<td>19,5</td>
<td>27,8</td>
</tr>
</tbody>
</table>
Hungary

- both lineage 1 and 2 strains circulating
- clinical cases by lineages 2 strains
Case distribution

Av2004: avian WNV cases in 2004
Av2005: avian WNV cases in 2005
Ov2005: sheep encephalomyelitis
Av2007: avian WNV cases in 2007
Eq2007: first equine encephalomyelitis in 2007

Equine cases in 2008☆
Europe 2008-2012

Lineage 2 strain

Lineage 2 strain

Lineage 1 strains
Reported cases of West Nile fever for the EU and neighbouring countries
Transmission season 2010; latest update: 05/06/2013

European Centre for Disease Prevention and Control

- Red: Area reporting cases in 2010
- Grey: Area not reporting cases in 2010
- White: Not included

Number of cases:
- 1
- 5
- 10
- 50
- 100

Countries:
- Malta
- Andorra
- Monaco
- San Marino
- Liechtenstein

© ECDC 2013 / SRS/EVD / EOC
© Map production: SRS/EIVM
ECDC data

- Area reporting cases in 2014
- Area not reporting cases in 2014
- Not included

- Malta
- Andorra
- Monaco
- San Marino
- Liechtenstein
<table>
<thead>
<tr>
<th>country</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>1</td>
</tr>
<tr>
<td>Greece</td>
<td>15</td>
</tr>
<tr>
<td>Hungary</td>
<td>11</td>
</tr>
<tr>
<td>Italy</td>
<td>24</td>
</tr>
<tr>
<td>Romania</td>
<td>23</td>
</tr>
<tr>
<td>Bosnia and Herzegovina</td>
<td>13</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>29</td>
</tr>
<tr>
<td>Serbia</td>
<td>76</td>
</tr>
</tbody>
</table>
OIE reported 2008-2015
2015

ECDC data
Prevention

- Vaccination
- Education, information
- Need for persistent serosurvey and virus isolation

One bite. One life changed forever. Protect yourself.

West Nile Virus can strike anyone of any age. And one out of five who are infected will suffer a debilitating illness that can last a lifetime. Worse yet, some will actually lose their life. Take action and protect yourself all summer.

Remember the four Ds:

- Use DEET-enhanced insect repellent. (2% soy-based, organic products also available.)
- DRESS in long sleeves and pants.
- Avoid the outdoors from DUSK to DAWN.
- DRAIN standing water outside your home.

For more information call the West Nile Virus Hotline at 303.441.1460. Or visit www.bouldercountymosquito.net.
Postvaccination IgG, IgM

<table>
<thead>
<tr>
<th>GROUPS</th>
<th>HIT RESULTS IgG</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: naturally infected (positive)</td>
<td>38 (30.89%)</td>
</tr>
<tr>
<td>2: non-infected (negative)</td>
<td>85 (69.11%)</td>
</tr>
<tr>
<td>3: double primovaccination and seropositive 12 months later</td>
<td>57 (86.36%)</td>
</tr>
<tr>
<td>4: double primovaccination and seronegative 12 months later</td>
<td>9 (13.64%)</td>
</tr>
<tr>
<td>5: double primovaccination + yearly booster and seropositive 12 moth later</td>
<td>11/11 (100%)</td>
</tr>
</tbody>
</table>

**Horses included in the study**: 200

<table>
<thead>
<tr>
<th>Group</th>
<th>IgM seropositivity after vaccination (booster or 1st primovaccination)</th>
<th>IgM seropositivity after vaccination (2nd primovaccination)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IgM Elisa</td>
<td>HIT IgM</td>
</tr>
<tr>
<td>1</td>
<td>1/7</td>
<td>2/7</td>
</tr>
<tr>
<td>2</td>
<td>0/7</td>
<td>0/7</td>
</tr>
<tr>
<td>3</td>
<td>2/7</td>
<td>0/7</td>
</tr>
<tr>
<td>4</td>
<td>4/7</td>
<td>1/7</td>
</tr>
<tr>
<td>5</td>
<td>2/7</td>
<td>0/7</td>
</tr>
</tbody>
</table>

- **Lineage 1 vaccines are protective**
The West Nile Virus (WNV)

- zoonotic
- reportable to EU
- in Hungary: IgM ELISA only NFCSO central lab
- test paid by the state
- actions: report exact GPS coordinates, in case of a death PCR analysis
Outbreaks

- non-predictable
  - eg. 2012 USA, 286 human deaths in Texas
  - Macedonia, Greece: 2010-2011
Thank you for your attention!