Equine Piroplasmosis

- Life-long infection of equids by hemoparasites
  - Babesia caballi
  - Theileria (Babesia) equi
- Spread by certain species of ticks or exposure to infected blood/blood products
- Vertical transmission can occur, but not efficient
- Clinical signs can include fever, lethargy, inappetence, anemia, icterus, colic, weight loss, exercise intolerance, sudden death; or no signs at all
- Endemic in tropical/subtropical areas of Mexico, Central/South America, Africa, Asia, Middle East, Europe, Caribbean
- EP-testing required for importation into the U.S.

U.S. Import Requirements

- All horses except those from Canada and Iceland are required to be tested for equine piroplasmosis at the U.S. import centers and border ports
- Previously used CF test for EP until August 2005 – chronic phase of disease yields false negative on CFT
- Now using both eELISA (chronic infections) and CFT (acute infection/recent exposure) as the official EP import tests

Relevance to Clinical Practice

- Re-emergence of equine piroplasmosis (EP) as a concerning foreign animal disease in the United States has been a relatively recent event that many practitioners are unaware of
- New pathways for the disease incursion, primary route of transmission, and current high-risk groups in the United States have been confirmed just within the past 8 years and are different from those parameters seen with EP in endemic countries
- Practitioners play a primary role in surveillance testing, identification of suspect and clinical cases, and educational outreach to owners of high-risk horses

History of EP in the U.S.

- Considered a foreign animal disease (FAD) in the U.S.
- Found in portions of FL in the 1960’s, but eradicated in the 1980’s
- Several competent tick vectors present in the U.S.
- Recent outbreaks:
  - Florida 2008: 20 horses associated with unsanctioned racing
  - Missouri 2009: 8 horses associated with unsanctioned racing
  - Texas 2009: 413 horses associated with a ranch in Texas
  - 2010-present: iatrogenic transmission in QH racehorses


- Index case – QH mare at south Texas veterinary clinic
- Confirmed at NVSL to be acute T. equi infection
- Ranch of origin (located in South Texas) tested:
  - 292 positives out of 360 horses
  - T. equi infection in all 4 ranch divisions
- Working cow horses
- No risky husbandry practices
- Heavy tick infestation
Tick Survey and Transmission

- Tick species collected from index ranch in order of highest density found (heavy tick activity)
  - *Amblyomma cajennense*
  - *Amblyomma maculatum*
  - *Dermacentor variabilis*
  - *Anocentor (Dermacentor) nitens*
- *Amblyomma cajennense* and *Dermacentor variabilis* from index ranch horses proved capable of transmitting *T. equi* to research horses (USDA/ARS, Pullman, WA)
- *A. cajennense* not previously documented as a competent vector

Summary of 2009 Texas Ranch Outbreak

- 2,500 horses tested in the outbreak
- 413 positive horses identified
- Infection on the ranch since at least 1990
- Tick-borne transmission on the index ranch and 4 High-Risk premises near index ranch
- No spread by ticks on any premises outside of south Texas
- Need specific high-risk factors on a given premises to efficiently transmit *T. equi* to other horses by tick-borne transmission:
  - Multiple infected horses
  - Heavy infestation by competent tick vectors
  - Maintenance of competent vectors year round?
  - Long periods of time in high-risk conditions

2010-2018: EP-Positive Horses Unrelated to Texas Ranch Incident

- Movement and surveillance testing:
  - States imposed movement testing restrictions on each other
  - New Mexico initiated EP testing in QH racehorses (2010)
  - Positive findings in racing QHs led to more states with EP testing requirements to enter racetracks
  - AQUA - required EP testing for World Shows 2011 (no positives found)
  - More than 342,000 U.S. horses have been tested for EP since Nov. 2009
  - QH racehorse cases – some co-infected with EIA

EP Surveillance Testing by Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Horses Tested</th>
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<tbody>
<tr>
<td>2009</td>
<td>23,202</td>
</tr>
<tr>
<td>2010</td>
<td>232,022</td>
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<tr>
<td>2011</td>
<td>342,000</td>
</tr>
<tr>
<td>2012</td>
<td>342,000</td>
</tr>
<tr>
<td>2013</td>
<td>342,000</td>
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<tr>
<td>2014</td>
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<td>2016</td>
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</tr>
<tr>
<td>2017</td>
<td>342,000</td>
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</tbody>
</table>

Number of Horses Tested
**EP Positive Case Counts by Year**

387 EP-positive horses since 2009
(333 QH racehorses, 14 TB racehorses, 33 previous imports, 7 other)

**EP 2017: 48 new cases of T. equi**
45 QH racehorses, 2 horses illegally moved from Mexico, 1 previous import

<table>
<thead>
<tr>
<th>State</th>
<th># T. equi-positive</th>
<th>Risk Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona</td>
<td>1</td>
<td>QH racehorse</td>
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<tr>
<td>Georgia</td>
<td>3</td>
<td>QH racehorses</td>
</tr>
<tr>
<td>Florida</td>
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<td>Previous Import</td>
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<tr>
<td>Illinois</td>
<td>7</td>
<td>QH racehorses</td>
</tr>
<tr>
<td>Indiana</td>
<td>7</td>
<td>QH racehorses</td>
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<td>5</td>
<td>QH racehorses</td>
</tr>
<tr>
<td>Louisiana</td>
<td>6</td>
<td>QH racehorses</td>
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<td>QH race/horse/illegal movement</td>
</tr>
<tr>
<td>Virginia</td>
<td>3</td>
<td>QH racehorses</td>
</tr>
<tr>
<td>Washington</td>
<td>1</td>
<td>Illegal movement</td>
</tr>
</tbody>
</table>

**Current Management of EP Positives**

**Owner Options for Disposition:**
- Permanent Quarantine
- Euthanasia
- Export Out of the Country
- Long-term Quarantine with Enrollment in APHIS/ARS Treatment Research Program

- Breeding of positive horses to negative horses is allowed with mitigations in place
- Known EP positive horses are not currently moving to events/races/shows

**EP Treatment Update**

- High-dose imidocarb treatment protocol
  - More than 295 horses treated so far (including 163 from Texas ranch outbreak)
  - High rate of success – fewer than 20 horses have failed to clear the organism post-treatment on the first attempt
  - Some strain types of *T. equi* are more susceptible to the drug than others
  - Treated, cleared, test-negative horses are eligible for quarantine release
- Texas Ranch update:
  - Euthanized more than 130 horses
  - 163 horses treated and proven cleared
  - As of March 2012, no EP-infected horses left on the ranch

**EP Ongoing Challenges**

- Limited surveillance in high risk population
- Iatrogenic transmission
- Education and outreach
- Frequent change of ownership and movement
- Sanctioned (Unsanctioned)
- Movement into different disciplines

**Lessons Learned: EP**

- EP has been identified in three distinct populations in the U.S. – Texas ranch incident (eradicated), horses imported prior to 2005, the QH racing industry (mostly with ties to unsanctioned racing)
- Natural tick-borne transmission of EP in the U.S. is likely to be sustained and efficient only in certain geographic areas if the disease is allowed to exist in horses there
- EP transmission via iatrogenic means is causing ongoing transmission in the U.S. QH racing industry
- Surveillance testing and educational outreach in high-risk equine populations is the most effective way to mitigate iatrogenic spread of EP
- Treatment continues to be a promising exit strategy
- Surveillance in QH racehorses is declining and may not be adequate to find positive horses before they move to other sectors of the industry
- Need more involvement of equine practitioners to provide education and outreach to clients with horses in or acquired from high-risk populations (QH racehorses)
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