Rabies-A Review

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Rabies

• Comes from the latin word Rabere
• Means to Rage or Rave

Rabies Virus

• Belongs to Rhabdoviridae Family
• Enveloped single strand RNA virus
• Neurotropic virus
• Transcription and replication
• Occurs inside the Neuron
Rabies Virus
- Fatal Zoonotic Disease
- Transmitted to warm-blooded animals by bites
- Foxes, Raccoons, Skunks, bats, vampire bats
- Wild animals 91% of cases reported to CDC
- Transmission tends to be within species
- Host switching of rabies virus variants occurs
- Once established variants perpetuate and become enzootic

Time line
- 2300 BC¹
  - Dog owners in Babylonian city of Eshnunna fined
  - Due to dogs biting people causing death
- 800-700 BC¹
- Homer likes Hector to “raging dog”
- Sirius “exerts a malignant influence upon the health of mankind”

¹http://www.rabiesfree.org/page26.htm

Time Line
- 500 BC
  - Democritus-Records case of canine rabies
- 400 BC
  - Aristotle wrote “dogs that suffer from madness. This causes them to become very irritable and all animals they bite become diseased”
- 011-100 AD
  - Rabies is widespread across the Roman Empire, Greece and Crete

²http://www.rabiesfree.org/page26.htm
Time Line

- 001-100 AD
  - Cardanus describes saliva from a rabid dog as a virus
  - Virus is the latin word for poison
- 1800
  - Rabies becomes widespread
  - Europe, Ukraine, North America and Canada
- 1953
  - 1st case of rabies in a bat reported by CDC
- 1959
  - Dr. Robert Kissling develop fluorescent antibody test for rabies

Endemic in mammals and other warm blooded vertebrates
- Except Australia
- Eradicat from Great Britain, New Zealand, Iceland, UAE
- 2010
- Domestic animals 8% of all rapid animals reported in USA.

Colorado

- Low incidence
- 2007 skunks carrying rabies noted in eastern CO
- Variant has moved westard
- Common in eastern counties and front range
- 2013 Colorado Department of Public Health
- Rise in number of rabid skunks in populated areas
Rabies in Horses and Mules
2003

Distribution of Rabies 2010

Horses and Mules With Rabies
2010

- 37 horses or donkeys tested positive for rabies
- CT, CO, MI, MT, NC, NE, NM, TN, VA, WV
- NY
- OK, PA
- TX
- Raccoons and foxes-Eastern US
- Bats-TX and OK
- Skunks-Northeast US, Mid-Atlantic and Central Midwest
### Rabies by Month
**Colorado 2013**

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<tr>
<th>Month</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
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*State of Colorado Public Health and Environment*

### Rabies in Colorado
**Jan 1-May 16 2014**

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*State of Colorado Public Health and Environment*
Clinical Signs

- Wide range of clinical signs
- Poor racing performance
- Bizarre behavior
- Spinal cord, cerebral, cranial nerve signs
- Lameness
- Gastrointestinal signs
- Genitourinary signs
Clinical Signs

• Progressive signs until death
• Usually occurs by day 10
• Average survival onset of signs to death
• 5 days

Spinal Cord Signs

• Subtle hindlimb lameness
• Shifting of weight in hind limbs
• Progression to knuckling of one or both fetlocks
• Ataxia and weakness
• Paresis advances to paralysis
• May also see constipation, tenesmus
• Paraphimosis
• Dribbling urine due to bladder paralysis
• Flaccid tail and anus
Classic Encephalic Signs

- Progressive depression (dumb form)
- Progressive aggression (furious form)
- Obtundation may be extreme
- Aggression includes hyperesthesia and self mutilation

Classic Encephalic Signs

- Accentuated cerebral responses
- Excessive mounting behavior
- Generalized pruritus leading to self injury
- Tremors, seizures
- Alert eyes despite paralysis or ataxia
- Blindness, headpressing, bellowing opisthotonus
- Dysphagia, salivation, weak tongue

Differential Diagnoses

- Injury/trauma
- Spinal cord neoplasm
- West Nile
- EEE
- EPM
Contrast

Diagnostic Test

- Hematology
  - Nonspecific
- Biochemistry
  - Nonspecific
- Cerebral spinal fluid
  - Increased protein, lymphocytes
  - Not diagnostic
- PROBLEM
  - NO ANTEMORTEM TEST

Postmortem Tests

- Brain tested
- CNS tissue smears using direct immunofluorescence
- Other tests
  - ELISA assay
  - RT-PCR
  - IHC
  - Cornea impression smear not reliable
Postmortem Findings

- Cerebellum eosinophilic neuropodies
- Cytoplasm colonized rabies virus

Postmortem

- Cerebellum with RABV aggregates
- Retina with RABV

Therapy

- No effective therapy for unvaccinated or vaccinated horses with clinical rabies
Rabies Vaccination Protocol

- Adult Horses
  - Annually
- Broodmares
  - Annually before breeding
- Foals
  - From Vaccinated mares:
    - First dose 6 months
    - Second dose 7 months
    - Boost 12 months then annually
  - From Unvaccinated mares:
    - First dose 3-4 months
    - Second dose 12 months
    - Boost annually

Exposure to pet?

Wild animal available for testing?

Is animal a bat, skunk, raccoon, fox?

Sufficient contact to transmit rabies?

Determine vaccine status of pet

Determines

Status of pet

Contact with local or state health department

Submit for testing

Positive?

Update pet’s rabies vaccine

Is wild animal rabies reservoir animal?

Bat, skunk raccoon, fox

No Risk

Update Pet’s Rabies Vaccine

NO

YES

NO

YES

NO

YES
Public Health Considerations

- Zoonotic disease
- No documented cases of transmission of horse to human
- Possibility is real
- All equid rabies suspects
- Should be handled only by people who have had rabies pre-exposure

Public Health Considerations

- Make a list of all “in-contact” individuals
- List of potential “in-contact” individuals
- Include owners and private parties
- Place clipboard near stall or houses of rabies suspect and require everyone to sign sheet
Public Health Considerations

- If rabies is on dfdx notify laboratory personnel handling bodily fluids
- Best to label everything with “rabies suspect”
- Rabies is preventable when proper post-exposure prophylaxis is administered after an exposure

Public Health Considerations

- Rabies suspect should be handled carefully
- Protective gear includes eye goggles, face shields/masks and gloves during all examinations

Public Health Considerations

- If performing necropsy more protective gear should be worn
- Rubber boots, scrub suit, double gloves (outer heavy vinyl) and face shield
- When removing brain where Tyvek suit or surgical gown minimum
- (Mist mask rated for biohazards as well)
Positive Test

- All interested parties should be notified immediately
- Including state veterinarian
- Local and or state health authorities
- Post exposure treatment varies depending upon suspected levels of exposure and pre-exposure status

Post-Exposure Prophylaxis

- If pre-exposure vaccination
- Or received post exposure vaccinations
- Only need 2 doses of vaccine
- Day of exposure
- 3 days post exposure
- Human rabies immunoglobulin not needed

Post-Exposure Prophylaxis

- Not vaccinated
- Combination of human rabies immune globulin (HRIG)
- Vaccine both recommended
- Day of exposure-HRIG and vaccine
- Rabies Vaccine again on days 3, 7, and 14 days
- Highly effective at preventing rabies if given as soon as possible following exposure
Questions?