Rabies & A retrospective of rabies in Ky from 1989 - 2016

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Etiology
- Viral infection of the Nervous System
- Virus is carried in saliva of infected animals
- Evades immune surveillance by sequestering itself in the nervous system.

Epidemiology
- Global zoonosis
- Most attention is focused on preventive strategies
- Prevalence varies by location
- Multiple variants

Species affected by Rabies
- Dogs
- Cats
- Cattle
- Horses
- Wildlife
- Humans
- Basically any milk producing animal/mammals

100% preventable, yet 100% FATAL if not caught in time!
How to get Rabies

- Bit by an infected animal
- In rare cases, it spreads via infected saliva coming in contact with mucous membranes or even broken skin

Clinical Signs of Rabies

**Animals**
- Irritability
- Problem swallowing/foaming of the mouth
- May lose fear of humans (wildlife)
- May show signs of paralysis (facial)
- Expression change (drooping head, sagging jaw, paralyzed hind limbs)
- Depression/retreat to isolated area
- Behavior change

**Humans**
- Irritability
- Problem swallowing
- Headache
- Fever
- Convulsions
- Delirium
- Ultimately Death

Once clinical signs occur, the patient (human or animal) will die. There is no treatment that will cure the patient at this point.

Testing

**Samples needed**
- Euthanasia should be performed in a way to maintain integrity of the brain
- Performed by a lab designated by the local or state health dept.
- Fresh frozen (unfixed) tissues are preferred
- Chemically fixed tissues will delay testing and might impede reliability of testing

**Tests performed**
- Direct fluorescent antibody (dFA) is most commonly used
- Can only be performed post-mortem
- Most rapid and reliable
- Electron microscopy (EM)
- Histologic examination
- Immunohistochemistry (IHC)
- RT-PCR
- Cell culture
- Virus structure
- Typing
- Virulence

Furious Rabies

- Animals may show signs of extreme excitement and aggression
- Animals may gnaw or bite their own limbs
- May attack stationary things or other animals
- Bouts of furious rabies alternate with periods of depression
Paralytic (Dumb) Rabies

- Depression
- Isolated areas
- Expression change
  - Drooping head
  - Sagging jaw
  - Paralyzed hind limbs
  - Abnormal facial change

Duration

- After infection, length of time to show clinical signs is variable depending upon location of viral entry site.
- Death will occur in 4 – 20 days after clinical signs

How Rabies Travels in the Body

1. Virus enters via antorbital
2. Virus replicates in lymph nodes and travels to spinal cord
3. Virus infects nerve cell and moves by retrograde transport
4. Virus travels to brain, spinal cord, eye, kidney, salivary gland
5. Brain infected

Rabies under the microscope

Cerebellum Purkinje cell inclusion body/Negri body

Neuron

Inclusion body/Negri body
Rabies under the microscope

Rabies under the microscope

Inflamed vessel/perivascular cuffing

Prevention of Rabies/ Pre exposure prophylaxis

• Series of vaccine injections
• Vaccinating pets
• Encouraging children not to touch or play with stray animals
• Pre exposure vaccine given to people that have jobs with high risk of exposure to animals that have or carry rabies

Post exposure prophylaxis

Preparation and administration

<table>
<thead>
<tr>
<th>Human rabies vaccine</th>
<th>Product code</th>
<th>Manufacturer</th>
<th>Route</th>
<th>Dose</th>
<th>Indications</th>
</tr>
</thead>
</table>
| Humanipal
Humanipal
Perflavine
Fabrication | 1 mL
1 mL
1 mL
1 mL | Intervet
Intervet
Hoffmann-La Roche
Upjohn | Intramuscular
Intramuscular
Intramuscular
Intramuscular | Preexposure or postexposure |

Rabies in Kentucky

• Last 27 years, KY has tested 30,359 animals for rabies
• Animals tested from 118 of Kentucky's 120 counties.
• 2.4% Positive rate (statewide) during that time frame
  - Individual counties may have a higher or lower rate overall or in specific years

Animals Testing Negative

• 28,176 Animals tested negative
• 92.8% of animals submitted
• Species testing negative
  - Alpacas, badgers, bats, beaver, bobcats, cats, dogs, cattle, coyotes, deer, elk, ferrets, goats, squirrels, llamas, mice, mountain lions, horses, hamsters, rabbits, raccoons, possums, skunks, weasels, zebras, wolves, sheep, NHP

Animals Testing Positive

• 723 Animals tested positive
• 2.4% of animals submitted
• Species testing positive
  - Bats
    - Cats
  - Cattle
  - Dogs
  - Foxes
  - Goats
  - Horses
  - Raccoons
  - Rats
  - Skunks

Animals with Unsatisfactory Test Results

- 1,460 Animals with unsatisfactory test results
- 4.8% of animals submitted
- Various reasons for an unsatisfactory test result
  - Brain in bad condition/autolyzed
  - Not enough brain to test (i.e. gunshot)

Monthly Testing Trend

Yearly Testing Trend

Exposure to Animals with Rabies

126/723 (17.5%) of positive rabies cases had NO known exposure to a human or pet.

Rabies Laws in Kentucky

- Dogs, cats and ferrets required to be vaccinated
- Veterinarians authorized to administer vaccine
  - Dog owners (only) may vaccinate provided
    - Owner takes course and passes exam
    - Permits are issued by Cabinet for Health and Family Services and renewed annually
    - Owner must vaccinate dog not owned by them/him
- Records must be kept for 3 yrs min
- Must be vaccinated by 4 months of age
- Titers do NOT represent a legal index of immunity in lieu of revaccination

Rabies Laws: Information by state:

www.rabiesaware.org
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- CDC
- WHO

QUESTIONS?