Rabies-
Public Health Surveillance and Disease Investigation

Marilyn Goss Haskell, DVM, MPH
NC DHHS Public Health Veterinarian
Veterinary Epidemiologist
North Carolina Division of Public Health
Learning Objectives

- Recognize the public health significance of rabies
- Know what constitutes a rabies exposure
- Know the importance of pre and post-exposure prophylaxis
Do donkeys get rabies?
Raccoons - the Terrestrial Reservoir

- All mammals susceptible
- Can transmit rabies to
  - wild mammals
  - feral mammals
  - domestic mammals
  - humans

http://phil.cdc.gov/phil/
High Risk Species

- Raccoons
- Bats
- Red and Gray Foxes
- Striped and Spotted Skunks
- Bobcats
- Coyotes
- Beavers
- Groundhogs (Woodchucks)
Rabies: Positives by Species, North Carolina 2009, (N = 473)

Raccoons are the reservoir and carrier for rabies in NC.
Human Rabies

- Human mortality
  - 55,000 deaths per year *worldwide*
  - 95% in Africa and Asia
  - Uncontrolled *canine variant* rabies

- US - past 25 years, a few cases per year
  - Overwhelming majority - Bat Variant
US Human Rabies
2000-2010, N=31

- 25.8% (8) infected outside US
- 74.2% (23) infected in US (indigenous)
  - 78.3% (18) bat variant
    - 15 (83.3%) bite or direct contact
    - 3 (16.7%) no known exposure
  - 4 bat variant organ transplants
- 1 raccoon variant, 2003 VA
Confirmed Rabid Mammals
NC 1952-2009  N= 9,412

Bat Rabies; 1st Identified 1963
Raccoon Rabies; 1st Identified 1991

Human Case
1953
The Expanding Epizootic of Raccoon Rabies, Eastern United States, 1977-1996

- 1977-1979
- 1980-1984
- 1985-1989
- 1990-1993
- 1994-1996
- No raccoon rabies detected

Epizootic convergence between Southeastern and mid-Atlantic rabies foci.

Major rabies virus variants
What causes rabies?

- A RNA virus
- Microscopic
- Other RNA viral diseases
  - Common cold, Measles, Flu, AIDS
How does rabies make you sick?

- Rabid animal bites
- Virus attaches to healthy nerve cell
- Virus replicates
- Viruses travel through nervous system

NEVER HANDLE BATS WITH BARE HANDS!
How does rabies make you sick?

- Virus moves to spinal cord, brain and salivary glands
- Brain swelling
- Coma and death

Rabies is 100% fatal without treatment!
How is rabies transmitted?

- **Bites** – Highest risk, most common
- **Non-bites** – a risk – consultations to LHD
  - Saliva to open wound, scratch, abrasion
  - Saliva to mucous membrane
  - Nervous tissue to open wound, scratch, abrasion
  - Nervous tissue to mucous membrane
- **Bats** – any direct contact or suspect contact
What is an exposure to rabies?

Any bite, scratch or other situation in which saliva or Central Nervous System (CNS) tissue from a potentially rabid or confirmed rabid animal enters an open wound, or comes in contact with a mucous membrane by entering the eye, mouth or nose.
What is a bat exposure?

- Thorough evaluation of all exposures
- Has bat been captured and tested?
- Direct contact with bat?
- Was bat found in the same room with:
  - a previously sleeping person,
  - a previously unattended child, mentally disabled person, or intoxicated person
- Request help from Veterinary Public Health
Why do Bats Pose Such a Risk?
Sixty Participants In Camp D.A.R.E. Get Rabies Shots After Bat Infestation
7/15 Hendersonville NC

Group to get rabies shots after being exposed to bats on mission trip
7/10 Thomasville NC

Woman Plagued By Bats In Chimney; Tenant: Landlord Closed Live Bats Inside Chimney
7/16 Greenville SC
Exposure Risk Assessment

- Does the exposure meet CDC definition?
- When?
- Animal species? Wild or domestic?
- Low or high risk?
- Can animal be positively identified?
- Provoked or unprovoked bite? If low risk – sick or prior injury?
- Animal captured? Tested negative?
  - Wild rabies vector – within 24 hours?
  - Domestic dog or cat – within 48 hours?
NC Rabies Laws
Notice and confinement of biting animals

Dog, Cat, Ferret: Reports

- Attending physician
- Person bitten
- Owner of animal
- Reportable to local health director
Vaccination

- NCGS 130A-185. Vaccination required
- (a) Vaccination required. - The owner of an animal listed in this subsection over four months of age shall have the animal vaccinated against rabies.
NC Rabies Laws

Shedding

- §130A-196
- Dog, cat, ferret bites human
  - 10-day Confinement
  - “shedding” period

Incubation

- §130A-197
- Potentially rabid or rabid animal bites
- 6 month quarantine or euthanasia (LHD decides)
- Incubation period (up to 6 months)
Incubation and Shedding Periods

Animal exposed to rabies virus

Incubation period up to 6 months

Onset of signs of disease

3-7 days

Applies healthy – non infectious

Excretion of virus from salivary glands

Shedding period

Death
NC Rabies Laws

- Rabid animal bites (vaccinated, domestic)
- Booster within 5 days
- Call Animal Control
NC Rabies Laws

- Dog, cat, ferret bites person
- Report to LHD
- Call ACS to capture animal
- Regardless of vaccination status
- 10-day confinement
- If not captured within 48 hours - begin PEP
Prevention of Rabies

- EDUCATION!!!
- Change behavior
- Common sense
- Pre-exposure vaccination
- Post-exposure management
Rabies Biologics

- Human rabies vaccines
  - Sanofi Pasteur
  - Novartis
- Rabies Immune Globulin
  - Sanofi Pasteur
  - Talecris Biotherapeutics
Pre-exposure Immunization

- Veterinarians and staff
- Laboratory workers
- Animal Control officers
- Animal shelter workers
- Wildlife workers
- Travelers to endemic countries
Pre-exposure Immunization Regimen

- 3 vaccines
- Days 0, 7, and 21 or 28
- IM deltoid
- Local Health Department or physician
- Titers – q 6m or 2 yrs
Post-Exposure Vaccination Regimen*:

- Wound cleansing
- 2 vaccines
- 1.0 ML IM deltoid
- Days 0 and 3
- No HRIG required

*Previously vaccinated people
### 2010 ACIP Recommendations

#### Human Rabies Post-Exposure Prophylaxis

<table>
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<tr>
<th>Day</th>
<th>0</th>
<th>3</th>
<th>7</th>
<th>14</th>
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<tr>
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<tr>
<td>2010 ACIP</td>
<td>1.0 ml vaccine IM (deltoid) &amp; 20 IU/kg HRIG</td>
<td>1.0 ml vaccine IM (deltoid)</td>
<td>1.0 ml vaccine IM (deltoid)</td>
<td>1.0 ml vaccine IM (deltoid)</td>
<td>No vaccine given</td>
</tr>
<tr>
<td>2010 Immune Compromised</td>
<td>1.0 ml vaccine* IM (deltoid) &amp; 20 IU/kg HRIG</td>
<td>1.0 ml vaccine IM (deltoid)</td>
<td>1.0 ml vaccine IM (deltoid)</td>
<td>1.0 ml vaccine IM (deltoid)</td>
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Post-Exposure Vaccination Regimen*

- Wound cleansing
- 4 or 5 vaccines
- 1.0 mL IM (HDCV or PCEC)
- Days 0, 3, 7, 14

AND

- Human rabies Immune Globulin (HRIG)
- Day 0
- 20 IU/kg body weight

* Previously unvaccinated people
Veterinary Public Health
Contact Information

1902 Mail Service Center
Raleigh NC 27699-1900

Phone: (919) 733-3410/733-3419
FAX: (919) 733-9555

http://www.rabies.ncdhhs.gov
References & Handouts

- CDC - ACIP Recommendations, 2008 & 2010
- NC Rabies Laws - Chapter 130A, Part 6. Rabies
- Rabies Pathogenesis Diagram
- Rabies Algorithms
  - Evaluation of Animal Bites for Rabies Risk
  - Protocol for Dogs and Cats Exposed to Rabies
- Pre-exposure Prophylaxis
- Post-exposure Prophylaxis Treatment
- Affidavit for Indigent Status - Request for Free State-Supplied Rabies Vaccine
References

- NC DPH Veterinary Public Health
- NC State Laboratory Public Health – Virology – Rabies
  http://slph.ncpublichealth.com/virology-serology/default.asp#rabies
- CDC Rabies http://www.cdc.gov/RABIES/
- NC Rabies Laws Chapter 130A
- NC Rabies Statistics
  http://slphreporting.ncpublichealth.com/VirologySerology/Rabies/PositiveCountBySourceCounty.asp