RABIES TRANSMISSION, PREVENTION AND TREATMENT

MAY 9, 2012

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Outline

- Rabies Background
- North Dakota Rabies Update
- Rabies Exposures and Vaccine Recommendations
- Rabies Case Studies

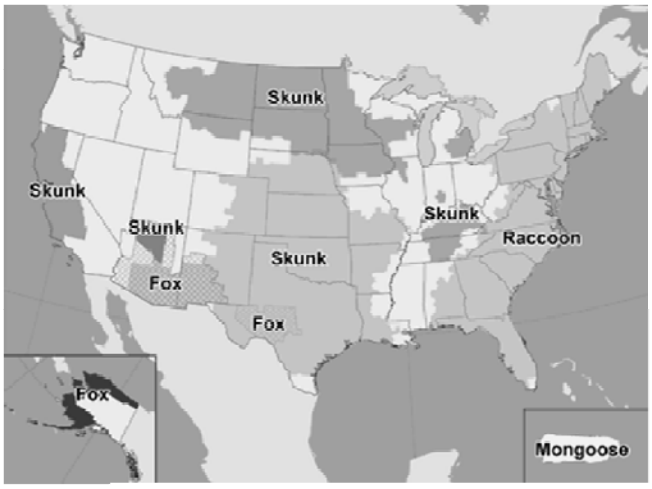
Rabies - Background

- Lyssavirus belonging to the Rhabdoviridae family
  - "bullet-shaped virus"
  - RNA virus
- Rabies is a virus that affects the central nervous system in mammals
  - Virus travels within the nerves
  - Within the brain, virus multiplies rapidly
    - Signs of disease begin to develop

Rabies - Background

- More than 90 percent of rabies cases reported each year in the United States occur in wildlife
  - 36.5% raccoons
  - 23.5% skunks
  - 23.2% bats
  - 7% foxes
  - 1.8% other species
- Raccoons and skunks are responsible for most reported animal cases in the United States
  - In ND – skunks
- Different variants (bat, skunk, raccoon, etc.)

Terrestrial Rabies Reservoirs(2010)



http://www.cdc.gov/rabies/location/usa/surveillance/wild_animals.html

Rabies in the U.S.

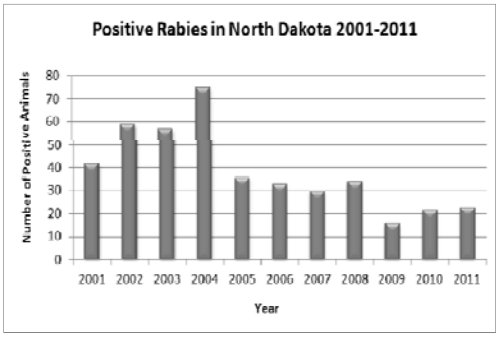
- Human cases – 1 to 3 each year
  - 49 human cases since 1995
    - Bat(31), Dog(11), Transplant(4), Fox(1), Raccoon(1), unknown (1)
- Estimated 25,000 to 35,000 human exposures
  - Most from domestic animal exposure
- 7,000 cases animal rabies

http://www.cdc.gov/rabies/location/usa/surveillance/human_rabies.html

Rabies in North Dakota

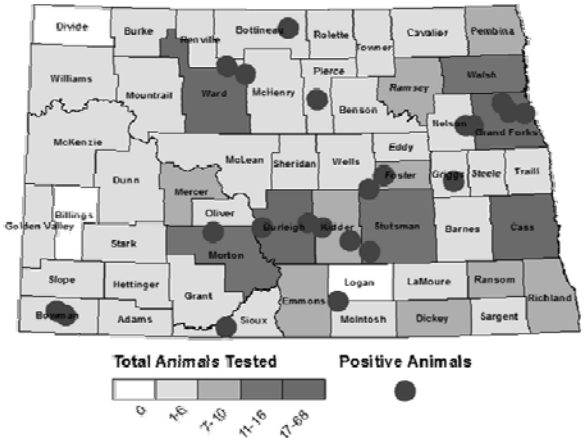
- ~ 350 to 450 animals tested per year
- ~ 30 positive rabies
  - 8% positive

Animal Type	Number Positive	
	2010	2011
Badger	1	0
Bat	2	1
Cat	4	1
Cow	2	2
Dog	2	2
Skunk	11	17
Total	22	23



Rabies in North Dakota

- Positive Animals Rabies Cases by County, North Dakota, 2011



Rabies in North Dakota

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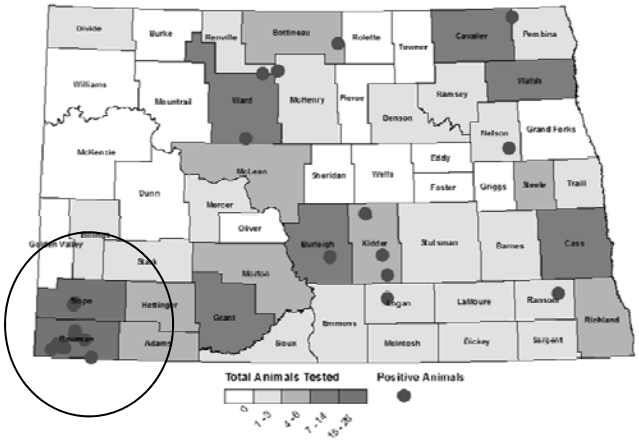
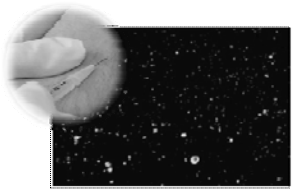


Species	Number Confirmed
Cat	1
Cow	3
Horse	1
Sheep	1
Skunk	28
Total	34
Last Updated: April 2012	

Rabies Exposure

- Definition of rabies exposure
  - Introduction of virus-laden saliva into the body through a bite or contact of the virus-laden saliva or neural tissue with an open wound or the mucous membranes.
    - *Blood is <u>not</u> infectious*
- All animal bites or other possible exposures should be assessed by a healthcare provider!



Rabies Exposure

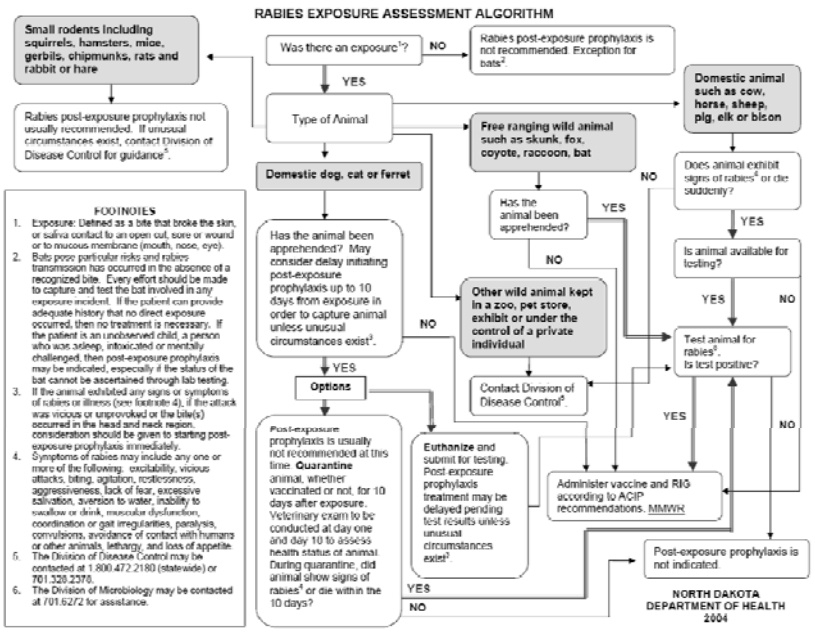
- Determine if exposure or possible exposure (bite or non-bite)
  - Bite from a rabid animal that breaks skin
  - Saliva from a rabid animal that comes into contact with:
    - Open sore, cut or wound in the skin
    - Mucus membrane of mouth, eyes or nose
    - Brain tissue/fluid contact with opening in skin
  - Scratches not exposures – except cats

Rabies Exposure

- Access the exposure (high risk, wound cleansing, exposure site, etc.)
  - Domestic or wild animal
  - Vaccination status, current
  - Provoked or unprovoked attack
  - Health status/behavior of animal
  - Animal available or reasonably attainable for testing or quarantine

Rabies In Domestic Animals

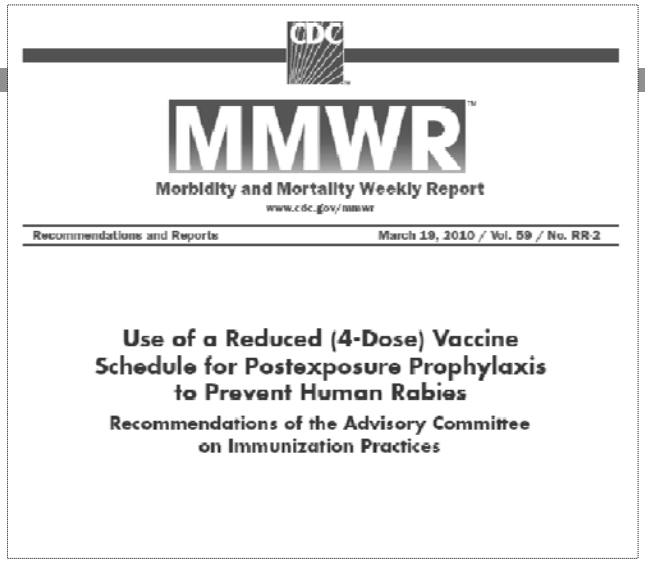
- Signs and symptoms of rabies develop when the rabies virus reaches and multiplies in the brain of the animal
- Signs and symptoms (changes in behavior or health)
  - Viciousness
  - Biting
  - Restlessness
  - Loss of appetite
  - Nervousness
  - Lack of fear
  - Excessive salivation
  - Sluggishness
- Incubation variable, typically 3 to 8 weeks (range 10 days to 6 months)
- Infectious period up to 5 days before symptoms appear
  - Dogs, cats and ferrets only (unknown in all other animals)



Rabies Virus Pathogenesis

- The key to preventing rabies is to neutralize the virus before it enters the central nervous system
- Local virus neutralization
  - Immediate and thorough wound cleansing
  - Passive immunization (RIG)
- Active immunization – vaccine series

Appropriate PEP Ensures Patient Survival


MMWR
Morbidity and Mortality Weekly Report
www.cdc.gov/mmwr
Recommendations and Reports March 19, 2010 / Vol. 59 / No. RR-2
Use of a Reduced (4-Dose) Vaccine Schedule for Postexposure Prophylaxis to Prevent Human Rabies
Recommendations of the Advisory Committee on Immunization Practices

4-Dose Rabies PEP Schedule

- Evidence reviewed and presented to ACIP during June 2009 meeting
  - Accepted the recommended 4 dose schedule for PEP for previously unvaccinated persons
    - Exception immunosuppressed individuals – 5 dose recommendation remains unchanged
- CDC released provisional recommendations few months later
- Recommendations for use published in **MMWR** on **March 19, 2010**

Vaccination Schedule

- Post-exposure prophylaxis – MMWR pg. 6

TABLE 3. Rabies postexposure prophylaxis (PEP) schedule — United States, 2010

Vaccination status	Intervention	Regimen*
Not previously vaccinated	Wound cleansing	All PEP should begin with immediate thorough cleansing of all wounds with soap and water. If available, a virucidal agent (e.g., povidine-iodine solution) should be used to irrigate the wounds.
	Human rabies immune globulin (HRIG)	Administer 20 IU/kg body weight. If anatomically feasible, the full dose should be infiltrated around and into the wound(s), and any remaining volume should be administered at an anatomical site (intramuscular [IM]) distant from vaccine administration. Also, HRIG should not be administered in the same syringe as vaccine. Because RIG might partially suppress active production of rabies virus antibody, no more than the recommended dose should be administered.
	Vaccine	Human diploid cell vaccine (HDCV) or purified chick embryo cell vaccine (PCECV) 1.0 mL, IM (deltoid area†), 1 each on days 0,§ 3, 7 and 14.¶
Previously vaccinated**	Wound cleansing	All PEP should begin with immediate thorough cleansing of all wounds with soap and water. If available, a virucidal agent such as povidine-iodine solution should be used to irrigate the wounds.
	HRIG	HRIG should not be administered.
	Vaccine	HDCV or PCECV 1.0 ml , IM (deltoid area†), 1 each on days 0§ and 3.

* These regimens are applicable for persons in all age groups, including children.
† The deltoid area is the only acceptable site of vaccination for adults and older children. For younger children, the outer aspect of the thigh may be used. Vaccine should never be administered in the gluteal area.
§ Day 0 is the day dose 1 of vaccine is administered.
¶ For persons with immunosuppression, rabies PEP should be administered using all 5 doses of vaccine on days 0, 3, 7, 14, and 28.
** Any person with a history of pre-exposure vaccination with HDCV, PCECV, or rabies vaccine adsorbed (RVA); prior PEP with HDCV, PCECV or RVA; or previous vaccination with any other type of rabies vaccine and a documented history of antibody response to the prior vaccination.

Vaccination Schedule

- **Pre-exposure**
  - 3 doses
    - Days 0, 7, and 21 or 28
- **Post-exposure** (previously vaccinated)
  - 2 doses
    - Days 0 and 3
- **Post-exposure** (previously unvaccinated)
  - 4 doses*
    - Days 0, 3, 7 and 14
  - RIG administer

*Immunosuppression – PEP 5 doses on days 0, 3, 7, 14 and 28

Rabies Case Studies

Adventure With Ranger Rick

- Raccoon picked-up and brought on bus on route to High School wrestling tournament
  - Raccoon, originally thought dead, escapes
- School officials pull wrestlers from tournament
- NDDoH notified of incident by concerned parent of opposing team
  - Wrestlers having contact with a wrestler who has been in contact with the raccoon on bus **not** at risk for rabies
- Worked with school and local health-care provider to assess students potentially exposed

The Coyote Was Wile

- Patient shot coyote and was bit on the hand as he attempted to check if it was still alive
- Coyote hit on head with gun
- Brain submitted for rabies testing
  - NDDoH Division of Laboratory Services
  - NDSU Vet Diagnostic Lab
- Brain unsatisfactory for testing
- Patient recommended to receive PEP
  - Refused treatment

A Pepe le Pew Performance

- Patient noticed pet cat and skunk fighting in yard
  - Shot and killed skunk
  - Submitted skunk for rabies testing
- Patient carried pet cat into house to bathe
- Cat bit patient on forearm
  - Cat unvaccinated for rabies
- Skunk tests positive for rabies
- Cat euthanized and tested for rabies
  - Cat tests positive for rabies

PEP!!

Resources

- Disease Control – 800.472.2180 or 701.328.2378
- CDC MMWR Human Rabies Prevention -- http://www.cdc.gov/mmwr/PDF/rr/rr5703.pdf
- CDC MMWR Reduced 4-Dose Schedule -- http://www.cdc.gov/mmwr/pdf/rr/rr5902.pdf
- CDC Rabies website -- http://www.cdc.gov/rabies/
- NDDoH Rabies website -- http://www.ndhealth.gov/disease/Rabies/


hank you for your time!