Rabies A Public Health Overview

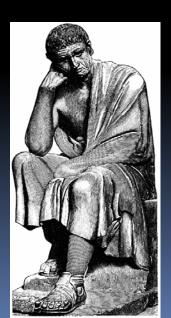
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Rabies History

Rabies History

- A recognized disease as early as 2300 BC
- Aristotle wrote about rabies in 322 BC
- Saliva of rabid dogs was recognized as "venomous" in the 1st century AD



Rabies History in the US

- First documented case in US
 - Virginia, 1753
- Colonial times-1950s
 - Dogs highest vector risk
- 1960s-today
 - Wildlife greatest risk





Rabies History on the East Coast

- Raccoon rabies
 - Noticed in Florida in mid 50s
 - Spread to mid-Atlantic region in 1970s
- Skunk rabies
 - Present in low levels in Southwest VA since 1960s
- Bat rabies
 - Present throughout the region

Why Rabies?

- 20,000 40,000 people exposed to rabies each year
- Infection is almost always fatal
- Public health costs (detection, prevention, control) > \$300,000,000 annually
- Rabies is endemic in the National Capitol

Area

Rabies Presentation Outline



Rabies Outline

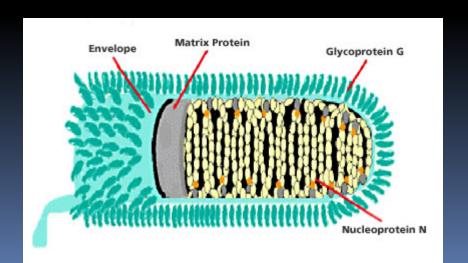
- Rabies Virus
- Rabies Disease and Diagnosis
- Rabies Exposure Risk and Animal Epidemiology
- Rabies Epidemiology in Humans
- Rabies Control and Exposure Response
- Rabies Control Messages for the General Public

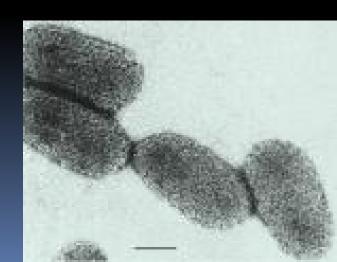
Rabies Virus



Rabies Virus Characteristics

- Only affects mammals
- Inactivated by drying, high temperatures, sunlight, most disinfectants
- Survives freezing
- Found in wet saliva and central nervous system tissue of infected mammals (typically symptomatic)







Rabies Virus Variants

- Raccoon
- Fox
 - Three variants
- Skunk
 - Three variants
- Bat
 - Multiple variants
- Mongoose

- Any variant can infect any species
- Majority of animals in this area are diagnosed with the raccoon variant each year



Distribution of Major Terrestrial Reservoirs of Rabies in the US and Puerto Rico, 2011



Rabies Disease and Diagnosis



Rabies Virus Transmission

- Most commonly transmitted by a bite
- Virus can NOT enter intact skin
- Other possible routes of transmission
 - Contamination of mucous membranes
 - Scratches only if contaminated with wet saliva or nervous system tissue
 - Aerosolization (suctioning)
 - Transplantation

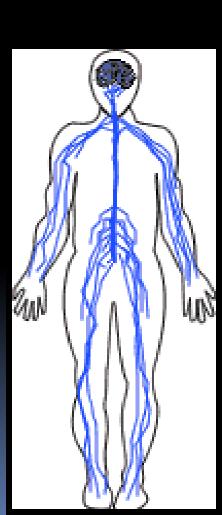




Rabies Virus Pathogenesis

- Virus enters the body
- Virus enters NM junctions
- Travels via peripheral nerves to spinal cord
- Then to brain stem and forebrain







Rabies Symptoms in Humans

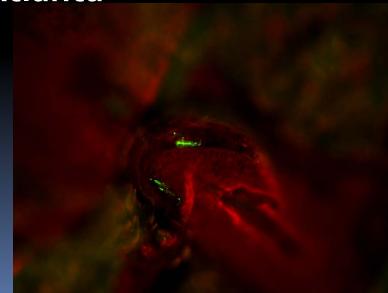
- Initial symptoms include anxiety, headache, mild fever, irritation at bite site
- Progresses to muscle spasms, difficulty swallowing, hydrophobia
- Clinical course is typically short





Rabies Diagnosis in Humans

- Ante Mortem Test
- Requires collecting saliva, spinal fluid, serum and a nuchal biopsy
- Through local health department and requires coordination with CDC in Atlanta
- Samples processed with DFA as with animals





Rabies Symptoms in Animals

- Clinical presentation is variable
- Early vague, nonspecific
- Behavioral more or less aggressive, vocalization
- Physical appetite loss, paralysis, seizures, coma, death
- Behavior or physical signs or symptoms that are clearly abnormal



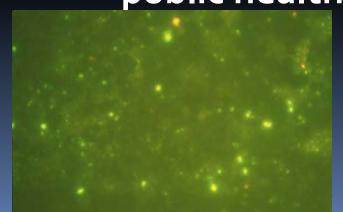
Rabies Diagnosis in Animals

- Postmortem test
- Samples should be refrigerated and submitted to the state laboratory
- Results available in about 24 hours
- Results reported to local health department



How is Testing Performed?

- No accurate test exists for examining live non-primate animals for rabies infection
- Animal necropsy of optimal parts:
 - Brain stem or medulla oblongata
 - Cerebellum
 - Hippocampus or Ammon's Horn
- Testing to be coordinated through local public health







Direct Fluorescent Antibody Test for Rabies Virus

- May be used on fresh or decomposed tissue
- Produces sensitive and rapid results
- Considered the most reliable of all available technologies
- Daily quality control steps assure accuracy



Rabies Exposure Risk and Animal Epidemiology



Dogs, cats, ferrets

- The time between when a dog, cat or ferret is bitten and when that animal will show signs of disease is known
 - Approximately 1-2 months, but can be as short as 10 days or as long as 6 months





Dogs, cats, ferrets

- The time between when a dog, cat or ferret starts shedding virus in its saliva and when that animal starts acting sick and then dies is also well established
 - The virus will kill the animal within eight days of it showing signs of illness.



Rabies Shedding in Other Animals

- For animals other than dogs, cats and ferrets, we do not know a definitive time period between when they start shedding the virus and when they start acting sick
 - This is why the only definitive observation times we have are for dogs, cats and ferrets



Rabies Risk of Transmission by Animal

High risk

- Carnivores (raccoons, skunks, foxes, coyotes, bobcats)
- Large rodents in raccoon variant endemic areas (beavers and groundhogs)
- Opossums in raccoon variant endemic areas
- Bats

Low risk

- Small rodents (e.g., squirrels, chipmunks)
- Rabbits, hares

Evaluate circumstances

- Exotic animals/hybrids
- Livestock





Rabies Risk by Animal Type

 For those animals for which no observation time has been established and do not fit into either a distinctly high risk or low risk category, the response is based on consideration of a number of factors including the scientific family of the animal, circumstances of exposure, how the animal is housed and/or health of animal.

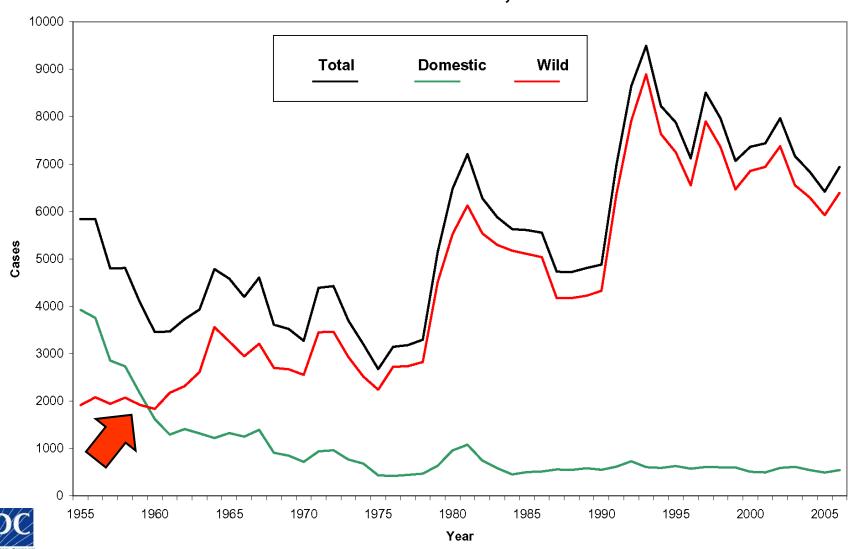
Rabies in Domestic Animals

- Domestic animals typically make up less than 10% of the total number of animals diagnosed with rabies each year
- Cats are the domestic animal most commonly diagnosed with rabies



Rabies Animal Epidemiology

Cases of Animal Rabies, 1955-2006

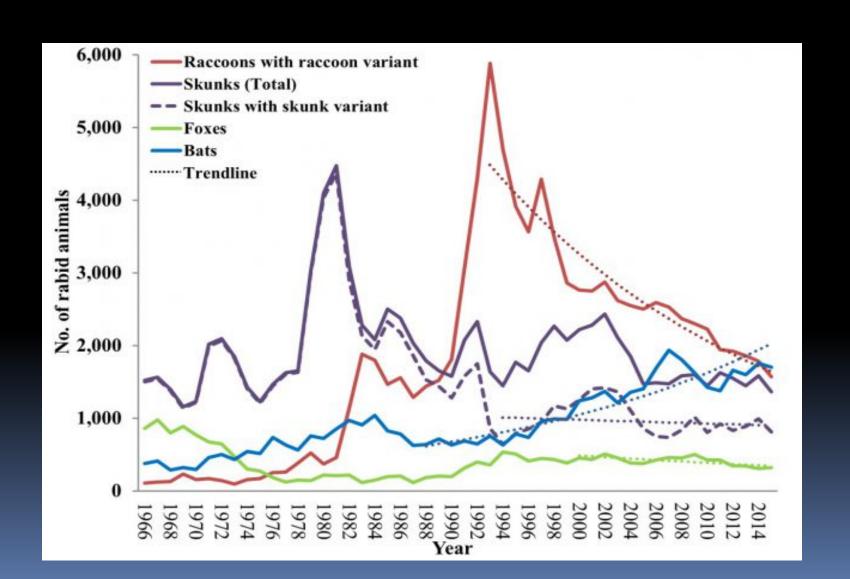


Rabies in Wildlife

- Wildlife have accounted for > 90% of reported rabid animals since 1980
- Raccoons, skunks, foxes and bats make up the bulk of rabid animals reported each year
- Raccoons are the most commonly diagnosed species in the National Capitol Area

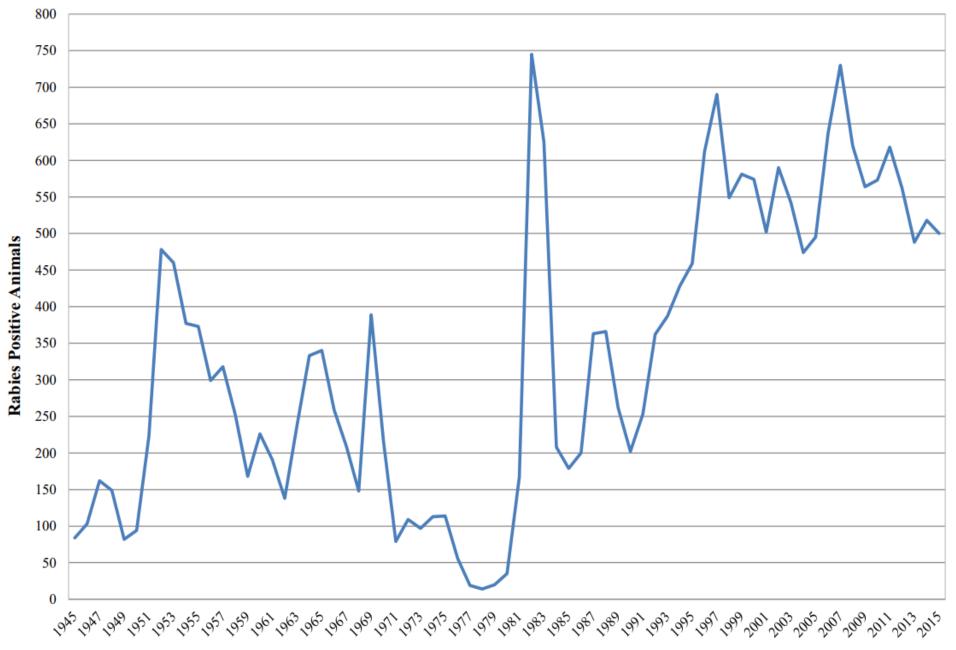


Rabid Wildlife in USA, 1966-2014





Number of Rabies Positive Animals in Virginia by Year





Animal Rabies in Virginia, 2015-17

Animal	2015	2016	2017
TOTAL	500	348	273
Raccoon	251	161	120
Skunk	121	91	67
Fox	38	27	34
Bat	15	16	19
Groundhog	7	2	2
Cat	37	27	22
Cow	20	12	4
Dog	4	4	1

Other animals that have tested positive for rabies include: beaver, coyote, deer, donkey, goat, horse, otter, mink, rabbit, rat, and opossum

Animal Rabies Fairfax District, 2016-2018

Animal	2016	2017	2018
TOTAL	33	27	29
Raccoon	18	21	17
Skunk	4	2	5
Fox	5	2	4
Bat	2	1	2
Groundhog	1	0	0
Cat	3	1	1
Cow	0	0	0
Dog	O	O	O

Rabies Epidemiology in Humans



Human Rabies Epidemiology in the United States

- 23 cases, 2008–17
- 48% (n=11) infected with a bat variant
 - Of these, 3 (27%) cases had unknown exposure
- 35% (n=8) were exposed outside of the U.S. and its territories





Human Rabies Epidemiology, Virginia Cases

- 1953 veterinary hospital worker
 - Unknown exposure
- 1998 prisoner in work program
 - Unknown exposure
 - Pipistrel/silver-haired bat variant
- 2003 office worker
 - Unknown exposure
 - Raccoon variant
- 2009 traveler to India
 - Exposed to dog
 - Canine variant
- 2017 traveler to India
 - Exposed to dog
 - Canine variant

Rabies Control and Exposure Response



Rabies Control in Domestic Animals and Humans

- Animal and human vaccination
- Animal control
- Pre- and postexposure management



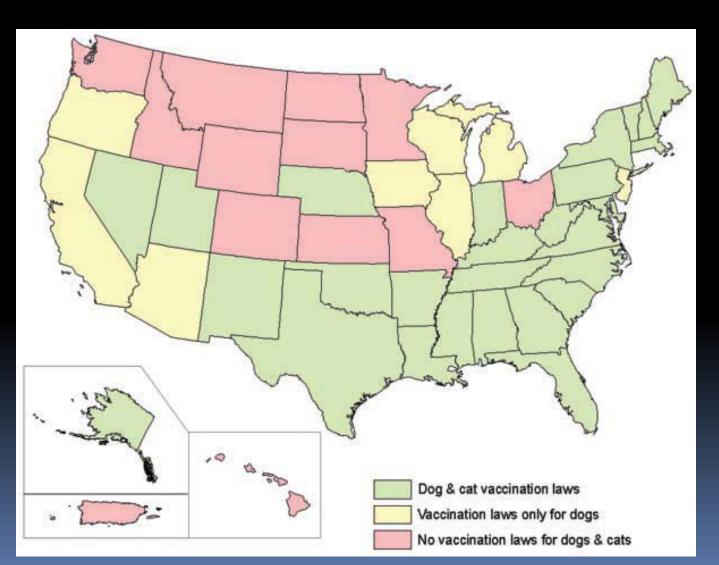


Domestic Animal Vaccination

- Required for dogs and cats in the National Capitol Area by 4 months of age
- Booster dose given 1 year after initial vaccination
- Thereafter, should vaccinate every year or every 3 years, depending on vaccine type
- Encourage use of 3 year vaccine



Domestic Animal Vaccination Laws 2009





Rabies Control in Domestic Animals

What constitutes an exposure?

- Exposure definitions are specific to jurisdictions
- Any circumstance where saliva or central nervous system tissue from a potentially rabid animal did have or could have had direct contact with mucous membranes or a break in the skin of a domestic animal is an exposure
- Note: The actual witnessing of a bite or attack by a potentially rabid animal is not required for an exposure to have occurred, however, a suspect needs to be witness in close proximity....



- Vaccinated dog, cat, or ferret exposed to proven or suspected rabid animal
 - Should receive immediate booster of vaccine
 - Confine for 45 days observation
 - Veterinary evaluation at first sign of illness
 - If thought to be rabies, euthanize and test





Confinement

- House animal in a building, pen, or other escapeproof method or enclosure
- Do not remove animal unless on leash and under control of responsible adult
- Owner should notify Health Department at first sign of illness and take to veterinarian



- Unvaccinated dog, cat, or ferret exposed to proven or suspected rabid animal
 - If available, test exposing animal
 - If exposing animal unavailable or tests positive, euthanize exposed animal or place in isolation for up to 6 months
 - Veterinary evaluation at first sign of illness
 - If thought to be rabies, euthanize and test
 - Vaccinate exposed animal before release from 6 months isolation



- Dog, cat, or ferret with expired vaccination exposed to proven or suspected rabid animal
 - Immediate booster to exposed animal (unless euthanized)
 - If available, test exposing animal
 - If exposing animal unavailable, 6 months strict isolation for exposed animal
 - Contact the health department to discuss situations where vaccination is recently expired



Strict isolation

- House animal in a kennel at a veterinary hospital, animal control facility, commercial boarding establishment, or pen at home
- Pen design should prevent direct contact between animal and human or other animal
- Pen design should allow for feeding, watering, cleaning (see example in Guidelines)
- District Health Director or designee should approve pen



- Livestock response similar to dog, cat and ferret if exposed to high risk species for rabies or carnivore confirmed with rabies
- If the only rabid animal associated with a herd or flock is an herbivore, monitoring for a period of 30 days for additional rabid animals in the herd or flock should be sufficient
 - Herbivores are not efficient transmitters
 - Monitoring for exposures that occurred when index case was exposed



Rabies Control for Humans

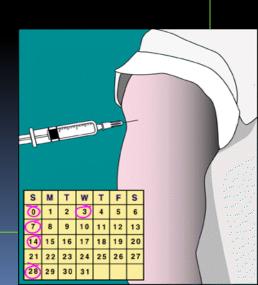
- Human exposed to a dog, cat, or ferret
 - Any dog, cat, or ferret (vaccinated or unvaccinated) that bites a person must be confined for 10 days observation
 - Veterinary evaluation at first sign of illness
 - If thought to be rabies, euthanize and test
 - Do not vaccinate during confinement





Rabies Control Guidelines for Humans

- Pre exposure series
 - High risk occupations: DVMs, ACOs, LVTs
 - Antibody measurement every 2 years
 - Boosters if exposed or low titer (routine boosters not recommended)
 - Should <u>not</u> receive RIG
- Post exposure series (for those with no prior vaccination)
 - RIG plus 4 vaccinations
 - RIG plus 5 vaccinations in some pts.





Rabies Control in Humans

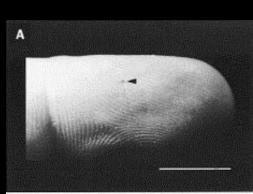
- What constitutes an exposure?
 - Any bite, scratch, or other situation where saliva or central nervous system tissue from a potentially rabid animal enters an open fresh wound or contacts a mucous membrane by entering the eye, mouth, or nose



Rabies Control in Humans

Bat Exposures

- Small bites; may go unrecognized
- Always ideal to test bat if available
- PEP indicated in response to:
- 1. Known bite
- 2. Direct contact and bite cannot be ruled out
- 3. Situations where exposure may have gone unrecognized like bat found in the same room as a sleeping or mentally impaired or very young person





Rabies Control in Humans

Scratches:

- A scratch should be evaluated like any other open wound, i.e. did saliva or some other virus containing material (cerebral spinal fluid, brain) contaminate the wound while it was fresh. A scratch in and of itself is not an exposure unless the paws were soaked with saliva, e.g., cat is salivating/drooling profusely or paws are visibly wet.
- A scratch from a known rabid animal is usually treated as a bite.



Rabies related laws

- Codes are specific to each jurisdiction
- Code of Virginia sections:
 - 3.2-6521. Rabies inoculation of companion animals
 - 3.2-6522. Rabid animals
 - 3.2-6562.1 Rabies responsibility plan
 - 18.2-313.1 Withholding information about a possibly rabid animal
 - 54.1-3812. Release of records

Rabies Control Messages for the General Public



Rabies Control Messages for Domestic Animals

- Keep rabies vaccinations up-to-date on dogs, cats, ferrets and livestock
- Supervise pets so they do not come into contact with wild animals
- Call animal control to remove strays or if your pet has contact with a high risk animal
- Teach children never to handle unfamiliar animals

Rabies Control Messages for Wildlife

- Enjoy wildlife from afar
- Never adopt wildlife
- Do not encourage wildlife to come close to/into your house
 - Avoid leaving pet food outside
 - Keep trash inside or use lids on trash
- Do not relocate wildlife

Rabies Control Messages for Humans

- If you've been bitten…
 - Decrease the chance of infection by washing the wound with soap and water
 - Capture the animal if this can be done SAFELY
 - Call animal control or local health department



Rabies Resources and Guidance

- www.cdc.gov/rabies
- www.nasphv.gov
- Human Rabies Prevention United States, 2008, Recommendations of the Advisory Committee on Immunization Practices (ACIP), MMWR 57 (RR03)
- Use of a Reduced (4-Dose) Vaccine Schedule for Postexposure Prophylaxis to Prevent Human Rabies, 2010, ACIP, MMWR 59 (RR02)
- Compendium of Animal Rabies Prevention and Control, 2011, National Association of State Public Health Veterinarians, Inc., MMWR 60 (RR06)





Rabies Campaigns





Sponsored by the Virginia Veterinary Medical Association and the Virginia Department of Health



Run Against Rabies

With the City of Alexandria (In Support of World Rabies Day)



Fun Run Against Rabies Hosted at:

Animal Welfare League of Alexandria 4101 Eisenhower Avenue, Alexandria, VA Saturday, September 8th, 2007

8:00 AM Registration (free) ~ 9:00 AM Fun Run/Walk (1.5 miles) 11-1:00 PM Vaccination & Microchipping Clinic More Info: http://www.alexhealth.org/fun_run.html

*Proof of vaccination required for animals to participate. Parking Available Next Door @ Cameron Run Regional Park
Sponsored by the Alexandria Health Department and the Animal Welfare League of Alexandria

Rabies Clinic Saturday June 28,2014

Cost is \$10.00 (cash only). The clinic will be held at the Chesterfield County Fairgrounds located at 10300 Courthouse Rd. Chesterfield, VA 23832 from 1:00-3:00 p.m. Cats should be brought to clinic in a pet carrier for safety.



Protect the ones you love. Vaccinate for rabies!

Sponsored by the Chesterfield Health Department of Health



Peninsula

Funding generously provided by City of Hampton Animal Services fing, supplies, and support provide Hampton Health Dept., &







Semi-Annual Rabies Clinic

Come join us

October 27th 2012

\$10 Rabies Vaccines

From 8am to Noon

Crossroads Animal Hospital

65 Jefferson Court, Gordonsville, VA 22942 (540) 832-1751





or in a carrier Please bring proof of any previous rables pet's vaccine will be good for one year.Pre-registering is ou will have more than 5 pets. Please ask us how!



Questions?