Investigation of potential rabies exposure situations

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What is rabies?

- Rabies is a serious viral disease that affects the brain and spinal cord of mammals (ex. dogs, cats, raccoons, foxes, humans)

- Primarily a disease of animals, but can spread from an infected animal to a person

- Rabies virus is present in the saliva and central nervous system (CNS) tissue of infected animals
  - Blood, urine, feces, skunk spray and fur of animals are not infectious
  - Outside the animal, rabies virus does not survive long
  - Virus does not survive long in dead animals

How is the virus transmitted?

- A person is considered **exposed** if they were:
  - Bitten by a rabid animal
  - Saliva or CNS tissue has gotten into recently bleeding open cut or mucous membrane (eyes, nose, mouth)

- A bite is by far the most efficient transmission mechanism

“Indirect” Rabies Exposures

- Possible indirect exposures
  - Handling pets after fight with wildlife
    - Saliva from wildlife on pet?
    - Open wounds on hands?
    - Touching of mucous membranes?

- There have been no documented cases of human rabies from indirect exposures but it is theoretically possible

Human Rabies

- Around 55,000 people die of rabies each year around the world
- Extremely rare in the US
  - ~ 1 or 2 cases per year
- Extremely rare in Massachusetts
  - <5 cases since 1992
- Virtually always fatal
- 100% preventable after an exposure with post-exposure prophylaxis (PEP)

Rabies Surveillance Data in Massachusetts 1992-2017

How common is Rabies in Massachusetts?

Species	Positive	Total	% Positive
RACCOON	3302	8471	39.0
SKUNK	1827	5539	33.0
BAT	656	17213	3.8
FOX	224	1064	21.1
CAT	191	25729	0.7
WOODCHUCK	124	2120	5.8
COW	15	127	11.8
COYOTE	14	166	8.4
BOBCAT	10	19	52.6
DOG	9	11033	0.1
HORSE	6	203	3.0
OTTER	4	10	40.0
PIG	4	51	7.8
FISHER	3	46	6.5
GOAT	3	187	1.6
Total	**6400**	**77693**	**8.2**

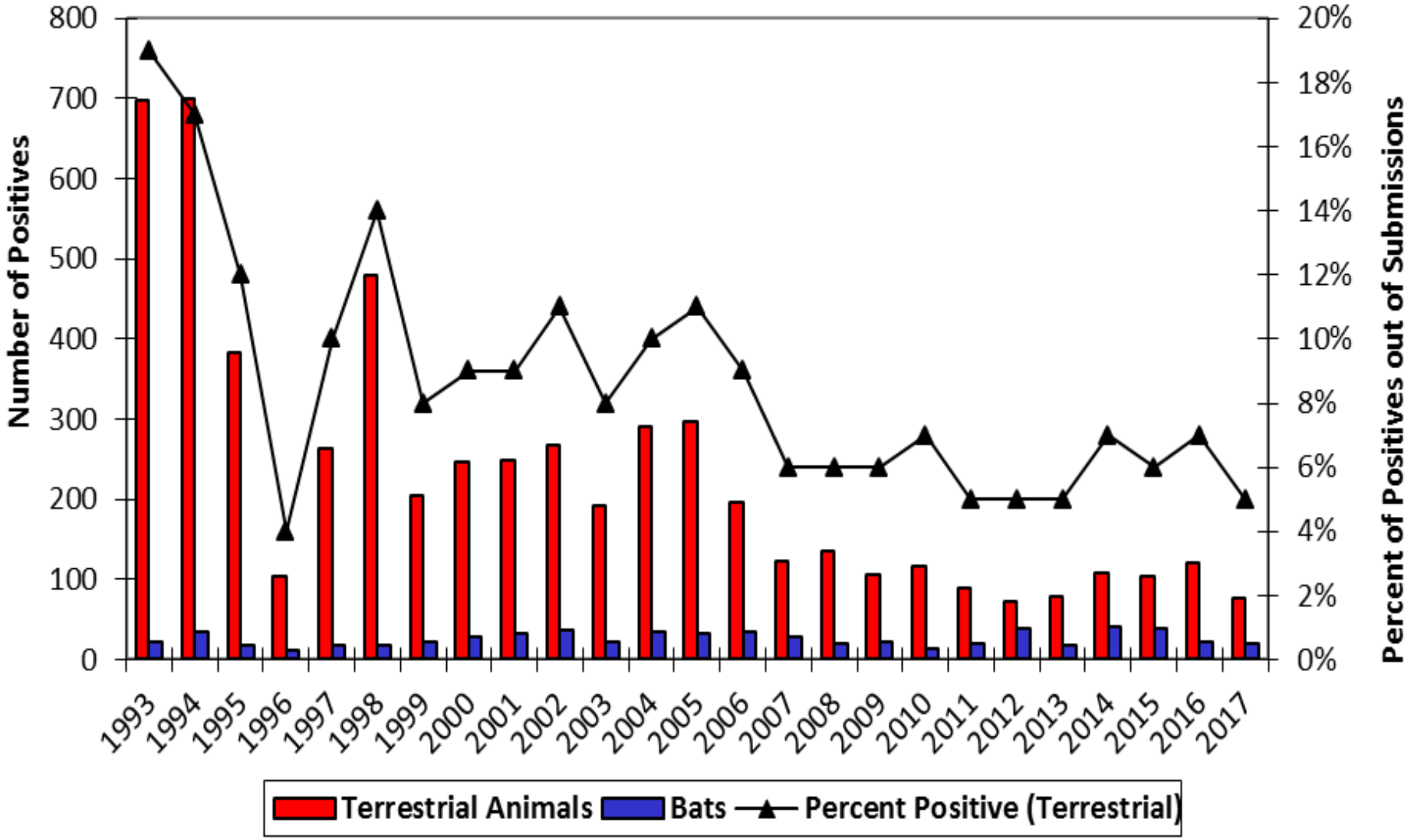
Massachusetts State Public Health Laboratory (MSPHL)

Rabies Laboratory 1992-2017

Rabies data by county level 1992-2017

	Positive	Total	% Positive
Barnstable	400	4312	9.3
Berkshire	330	2195	15.0
Bristol	718	6531	11.0
Dukes	0	125	0
Essex	704	9544	7.4
Franklin	194	1483	13.1
Hampden	351	4187	8.4
Hampshire	182	1788	10.2
Middlesex	1111	15170	7.3
Nantucket	0	50	0
Norfolk	731	9219	7.9
Plymouth	594	6530	9.1
Suffolk	177	6973	2.5
Worcester	907	9505	9.5
Unknown	1	80	1.3
Total	**6400**	**77693**	**8.2**

Figure 1: Numbers of Animals Positive for Rabies and Percent Positive by Year: Massachusetts, 1993-2017



2017 Rabies Surveillance Data in Massachusetts

2017 Rabies data by animal submission

Number of Animals Positive for Rabies/Animals Submitted, (%) Positive, 2017			
	# Positive	**# Submitted**	**% Positive**
Raccoon	34	115	29.6
Skunk	20	87	23.0
Bat	20	920	2.2
Fox	11	30	36.7
Woodchuck	8	86	9.3
Coyote	1	10	10.0
Cat	1	597	0.2
Bob Cat	1	1	0
Cow	0	2	0
Dog	0	520	0
Other*	0	85	0
Total	**96**	**2453**	**3.9**

2017 Rabies data by month

Submissions, Number Positive for Rabies, and Percent Positive by Month and Animal Type						
	Terrestrial Animals			**Bats**		
Month	Submissions	Positive (n,%)		Submissions	Positive (n,%)	
January	113	6	5%	27	0	0%
February	88	4	5%	24	0	0%
March	117	2	2%	34	1	3%
April	103	6	6%	25	1	4%
May	140	6	4%	33	2	6%
June	191	8	4%	124	3	2%
July	177	5	3%	94	3	3%
August	168	11	7%	466	3	1%
September	122	9	7%	34	4	12%
October	120	4	3%	24	3	13%
November	119	9	8%	14	0	0%
December	75	6	8%	21	0	0%
TOTAL	**1533**	**76**	**5%**	**920**	**20**	**2%**

2017 Rabies data by county level

Number of Animals Positive for Rabies/Animals Submitted, (%) Positive, 2017			
County	**Number Positive**	**Number Submitted**	**% Positive**
Barnstable	0	96	0%
Berkshire	7	76	9.2%
Bristol	11	164	6.7%
Dukes	0	6	0%
Essex	15	287	5.2%
Franklin	11	46	23.9%
Hampden	6	141	4.3%
Hampshire	4	77	5.2%
Middlesex	12	524	2.3%
Nantucket	0	1	0%
Norfolk	6	277	2.2%
Plymouth	0	200	0%
Suffolk	2	191	1%
Worcester	22	366	6.0%

What are the appropriate steps after a potential rabies exposure?

- Identify the animal
  - If exposing animal is a dog, cat, ferret or cow, implement 10-day quarantine.
  - If exposing animal is a high-risk wild animal, submit for testing.
  - If it involves a lower risk animal, call MDPH to consult.

- Depending on results of testing or quarantine, post-exposure prophylaxis (PEP) may be recommended.

Massachusetts Department of Public Health (MDPH)

Species Considerations For Rabies Testing

Category 1

ALWAYS test following human or domestic animal exposure

Species in this group are either known rabies vectors or are considered likely to have the potential to transmit rabies.

- Bat
- Bear
- Beaver
- Bobcat
- Coyote
- Fisher
- Fox
- Otter
- Raccoon
- Skunk
- Woodchuck

Category 2

Test following human or domestic animal exposure if 10-day quarantine is not possible or not appropriate (i.e., animal is already ill)

Species in this group can only transmit rabies up to 10 days before showing symptoms.

- Cat
- Cow
- Dog
- Ferret

Category 3

Requires MDPH or MDAR* approval for testing (handled case by case)

Species in this group are occasionally found to be rabid although bites from these animals have never resulted in a human case of rabies in the United States.

- Alpaca/llama
- Chinchilla
- Deer
- Domestic/pet rabbit
- Goat
- Guinea pig
- Horse
- Mink
- Moose
- Muskrat
- Opossum
- Pig
- Porcupine
- Sheep
- Squirrel
- Weasel

Category 4

Rabies testing NOT indicated

Species in this group are virtually never found to be rabid and bites from these animals have never resulted in a human case of rabies in the United States.

- Chipmunk
- Gerbil
- Hamster
- Mole
- Mouse
- Rat
- Shrew
- Vole
- Wild rabbit/ Cottontail

*Massachusetts Department of Agricultural Resources: 617-626-1786

For exposures involving an animal species not specifically listed OR unusual circumstances, consultation with the Massachusetts Department of Public Health Division of Epidemiology and Immunization is available 24/7 at 617-983-6800.

January 2010

10-day quarantine

- Recommended for cats, dogs, cows, and ferrets as there is documented literature on shedding periods – established length of time that an animal could have virus in its saliva prior to death
  - Studies show that virus is in the animal's saliva for a few days prior to death, 10 days includes a large buffer period
- <u>If a human is exposed on Day 0 and the animal is alive and well on Day 10, no testing or PEP is necessary</u>
- Quarantines issued by local Animal Inspectors (AI) as agents of the Department of Agricultural Resources (DAR)

Specimen submission

- Rabies lab tests specimens Monday-Friday, but specimens can be dropped off 24 hours/day,7 days a week
- Residents are asked to contact local Animal Inspectors (AI) or Animal Control Officers (ACO) to request assistance with specimen submission
- Bats can be submitted whole, but other species must be euthanized and prepared by a veterinarian (head only)
- Specimens should be kept cold, never frozen
  - If a specimen is accidentally frozen, keep it frozen during shipping
- Any specimen received by noon will have a result by end of work day

Post Exposure Prophylaxis (PEP)

- Recommended for any human exposure to a potentially rabid animal if quarantine or testing is not possible

- Recommended vaccine schedule: Day 0 (+ HRIG), Day 3, Day 7, and Day 14
  - Day 28 (5^{th} dose) recommended for immunocompromised individuals
  - Anyone who has previously completed the series only needs two booster doses of vaccine on Day 0 and Day 3
  - Vaccine often available only in an Emergency Department

- Insurance covers post-exposure prophylaxis (to the limit of the plan)

Pre-Exposure Prophylaxis

- Pre-exposure prophylaxis recommended for certain high-risk groups (ex. veterinarians, students)
- Recommended vaccine schedule: Day 0 Day 7, and Day 21 or 28
- Insurance rarely covers pre-exposure prophylaxis
- Usually available at hospital-affiliated travel clinics

Wound care

- Whether or not rabies PEP is recommended, a bite victim may need to see their provider for wound care:
  - Cleaning
  - Closure
  - Antibiotics
  - Tetanus vaccination (if indicated)

ROLE OF MDPH, DAR, LBOH IN RABIES EXPOSURE INVESTIGATIONS

Role of MDPH

- Rabies Lab:
  - Tests animal specimens for virus (only lab in state)

- Epidemiology Program:
  - Responds to inquiries from healthcare providers, veterinarians, Animal Control Officers (ACOs), Animal Inspectors (AIs), and members of the public about possible exposures
  - Conducts human risk assessments and make recommendations around 10-day quarantines for animals, specimen submission, and PEP
  - Report positive and unsatisfactory results

Role of LBOH / ACO / AI

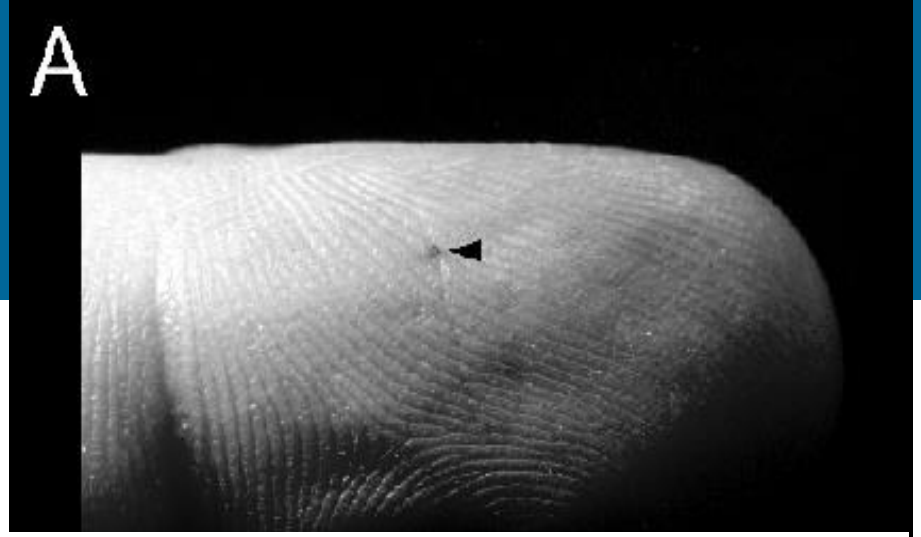
- Responsible for public health of residents in their jurisdiction.
- Attempt to identify and capture animals that bit or scratched residents in their jurisdiction.
- Critical role to assist in identifying exposing animals and specimen submission if necessary.
- Should develop and maintain relationship(s) with local veterinarians who can assist with euthanasia and specimen submission

Role of Animal Inspector (AI)

- Regulatory authority
  - to ensure exposing animals are submitted for rabies testing.
  - Implement a 10-day quarantine for cats, dogs, cows, and ferrets.

Typical scenarios

- Bat in house
- Wildlife exposure
- Domestic animal bite
- Livestock exposure



Comparison of wound from a silver-haired bat bite with the a silver-haired bat skull.

Alan Jackson and Brock Fenton
Lancet Vol. 457, Page 1714 (May 26 2001)

The silver-haired bat
(photo: Dr. Henry Feder, University of Connecticut Health Center)

Bat in house

- Bite marks not always noticeable
- What is considered an exposure?:
  - Known bite or scratch
  - Direct contact if a bite or scratch cannot be ruled out
  - Bat found in room with previously unattended child or incapacitated adult (or pet) who cannot report if an exposure has occurred
- What MAY be considered an exposure?:
  - Person awakes to find bat in bedroom (if person sleeps lightly, has a pet in the bedroom that would have chased the bat, is covered by sheet/blanket, etc. – exposure less likely)
- If exposure has occurred:
  - Bat should be tested (PEP recommended if positive or unsatisfactory)
  - If bat is unavailable for testing, PEP recommended
- If no exposure has occurred, PEP is not recommended

Wildlife Exposure

- High risk animal (almost all mammals except small rodents – ex. skunks, raccoons, foxes):
  - Trap and euthanize animal and submit for testing
  - PEP if animal tests positive or is unsatisfactory
  - If animal is unavailable for testing, assume rabid and PEP is recommended

- What is considered an exposure?:
  - Known bite
  - Saliva or CNS fluid / tissue in open (recently bleeding) cut or mucous membrane

- If no exposure has occurred, no testing or PEP recommended

Wildlife exposure, pet involvement

- Often, wildlife scenarios involve pets, e.g., dog fighting with raccoons
- Human exposure could be indirect:
  - Ask about how dog was handled after interaction with raccoon; was there any raccoon saliva on dog that could have gotten into human's cut or mucous membrane? (theoretical risk)
- Also concerned about pet's exposure:
  - Ask if pet is up-to-date on rabies vaccine
  - Recommend pet goes to vet for booster
  - Vet required to report to AI
    - Owner should be encouraged to contact AI also

Domestic Animal Bites (Dog, cat, cow, or ferret)

- If animal is known/identifiable, 10-day quarantine is required.
  - AIs/ACOs can help identify animal and issue quarantine
  - This is required regardless of vaccination status
  - Important to assess animal's rabies risk: vaccine history, symptoms (including behavior), exposure to wildlife
- If animal does not survive 10 days after bite and/or develops symptoms compatible with rabies, euthanize and submit for testing (required by DAR regulation).
- If animal is unavailable, consider circumstances of bite.

  PEP *may* be recommended

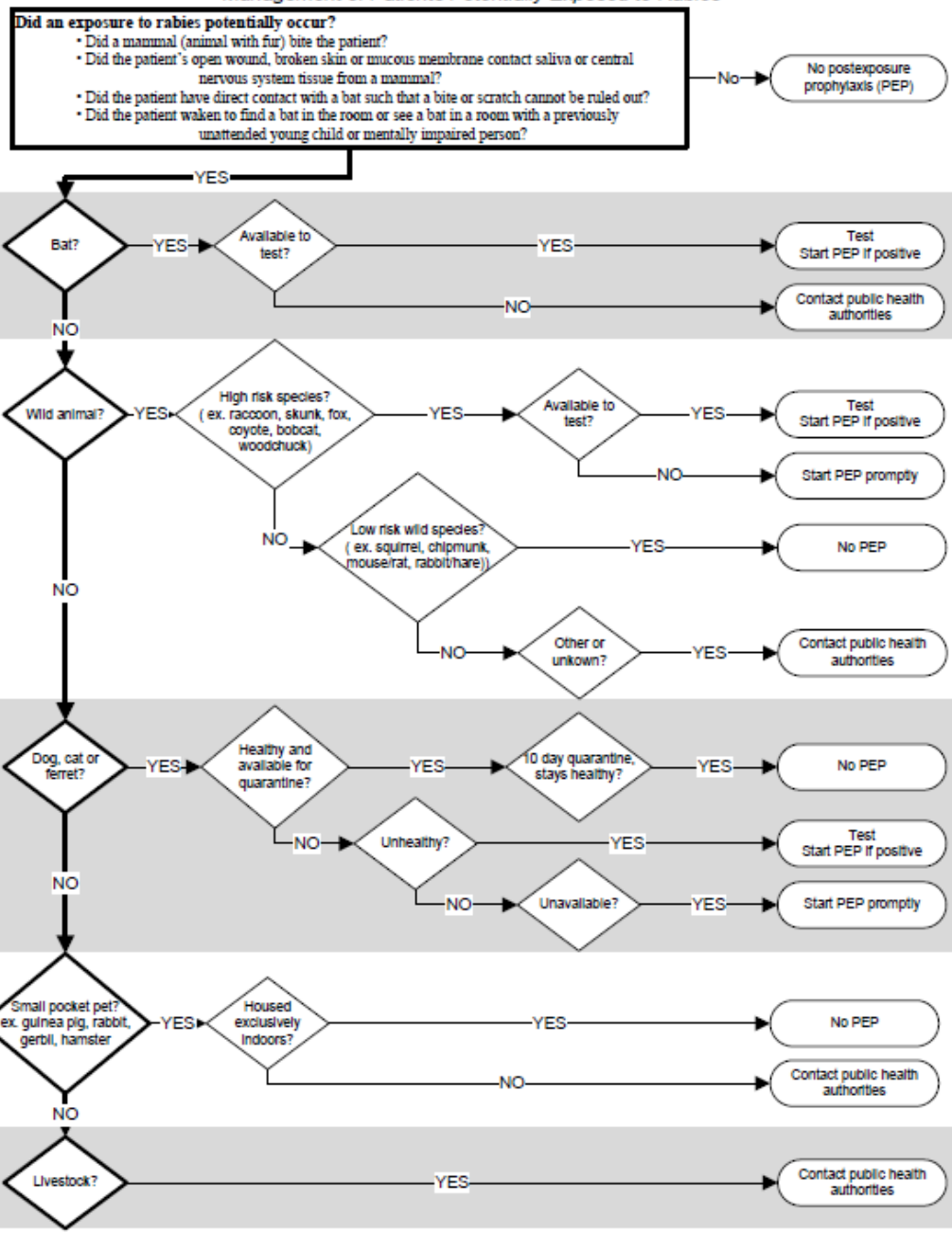
Livestock exposure

- Goats, horses, pigs, and sheep all Category 3 species
- Ask about animal's rabies risk:
  - Rabies vaccine history (request documentation)
  - Symptoms, including behavior
  - Obtain specifics for human exposure
  - Potential exposure to wildlife:
    - How is animal housed?
    - Any wounds of unknown origin?
- These scenarios typically require consultation with Zoonotic team leadership within MDPH and DAR

Small mammal exposure

- Small rodents such as squirrels, chipmunks, mice, rabbits
  - No PEP or testing unless circumstances very exceptional

Management of Patients Potentially Exposed to Rabies



Teamwork required between MDPH, LBOH / ACO / AI and DAR

- Goals:
  - Identify animals that need to be tested or quarantined
  - Assess risk of exposures
  - Ensure specimens requiring testing arrive at MA SPHL
  - Avoid unnecessary PEP for residents

Public Resources

- **MDPH**
  - www.mass.gov/dph/rabies
- **CDC**
  - https://www.cdc.gov/rabies/index.html
- **Rabies Specimen Submission Form**
  - https://www.mass.gov/files/documents/2016/07/qw/rabies-submission-form.pdf

Questions?

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