ZOOPER HERO!

Overview of Zoonotic Exposures for Emergency Medicine PAs

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OBJECTIVES:

Identify **clinical presentations** associated with animal exposures.

Review **etiology**, **epidemiology** & **geographic distribution** of animal-related disease

Discuss emergency department **evaluation & management** of zoonotic and animal-related disease

DISCLOSURES

non-declaration statement: I have no relevant relationships with ineligible companies to disclose within the past 24 months.

CASE 1

Ophelia is a 35-year-old woman whose hand was bitten by a snake while clearing some brush behind her home in central North Carolina. She states it appeared to have a triangular-shaped head & was a deep bronze color.

Her hand is minimally swollen, & after a period of observation in the emergency department, she is doing is fine with no lab abnormalities & no local pain.

WHICH OF THE FOLLOWING SNAKES MOST LIKELY BIT OPHELIA?

a) Copperhead
b) Cottonmouth
c) Rat snake
d) Western diamondback rattlesnake

Following a snakebite from an unknown species without envenomation, what is the most appropriate period of observation in the emergency department?

a) 30 minutes
b) 1 hour
c) 6-8 hours
d) 18-24 hours

CROTALID ENVENOMATION

ETIOLOGY & EPIDEMIOLOGY

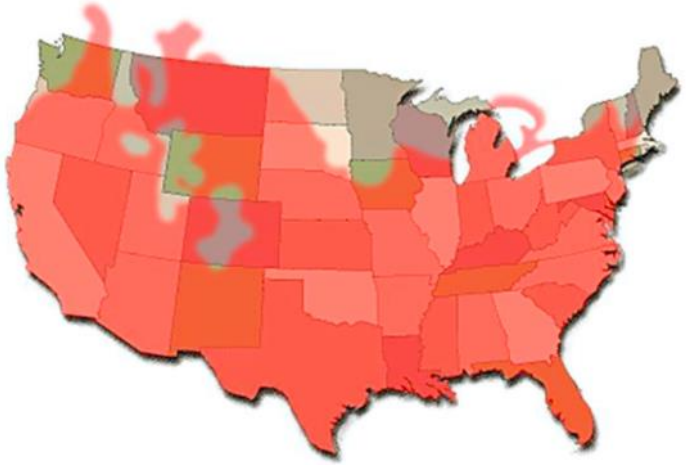
Copperheads, Cottonmouths, Rattlesnakes

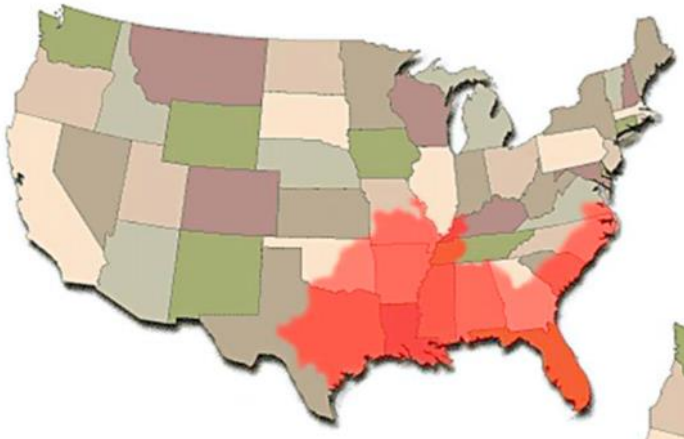
5000 venomous snake bites annually

Summertime dawn & dusk

Males age 20-40

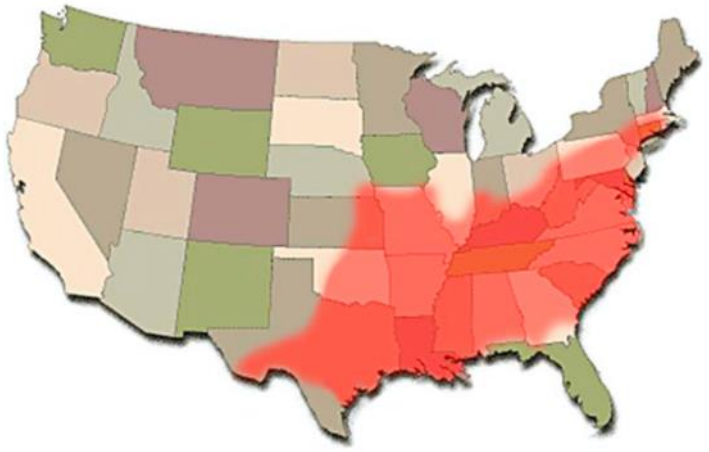
RATTLESNAKE





COTTONMOUTH

COPPERHEAD



PATHOPHYSIOLOGY & CLINICAL PRESENTATION

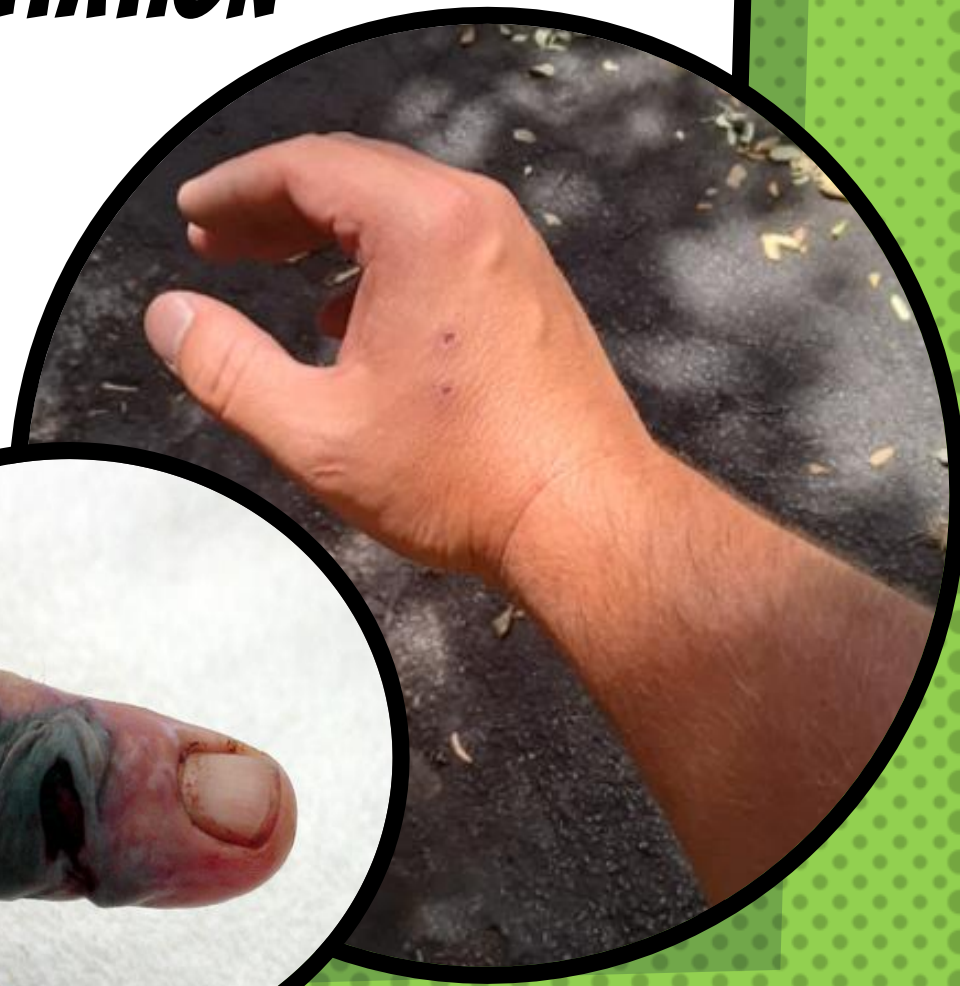
Local **tissue** & **muscle** damage: 90-100%

Hematologic toxicity: 40%

Cardiovascular manifestations: 5%

Neurotoxicity: only in some rattlesnakes

Dry bites: 25%



EVALUATION

ABCs:
Especially face & neck bites

Hx:
When & where
Signs& sxs
First aid
EtOH?
PMH

Exam:
Vitals
Inspect
Palpate

Dx:
CBC, BMP, CK, PT/INR, PTT, fibrinogen
UA, EKG

RE-EVALUATION IS KEY!

MANAGEMENT

ALL BITES: ABCS, WOUND CARE, TETANUS, ANALGESIA, POISON/TOX CONSULT

Dry Bites & Mild Envenomation

Monitor for **6-8 hours**

Serial examinations

Repeat labs at end of observation

POISON CONTROL: 1-800-222-1222

MANAGEMENT

ALL BITES: ABCS, WOUND CARE, TETANUS, ANALGESIA, POISON/TOX CONSULT

Moderate to Severe Envenomation

Antivenom therapy best if initiated within **6 hours**

Dose **not age- or weight-dependent**

Crofab 4-12 vial loading dose, repeat until progression halts, 2 vial maintenance Q6 hours

Anavip 10 vial loading dose, repeat until progression halts, no maintenance recommended

Trend labs and physical examination

POISON CONTROL: 1-800-222-1222

Ophelia was likely bitten by a **copperhead**.

In the setting of a dry bite, the patient should still be observed for **6-8 hours.**

CASE 2

Bruce Wayne is a healthy eccentric millionaire who seeks care after finding a bat in his master suite upon waking this morning.

He is unsure if he was bitten and denies any bite marks or areas of pain.

He Googled and is concerned he may develop rabies.

THE RABIES VIRUS IS PASSED ON BY CONTACT WITH WHAT PART OF AN INFECTED ANIMAL?

a) Blood
b) Claws
c) Saliva
d) Skin

WHICH OF THE FOLLOWING IS THE CDC'S CURRENT RABIES POST-EXPOSURE PROPHYLAXIS REGIMEN?

a) Human rabies immune globulin (HRIG) AND rabies vaccine on day 0 THEN rabies vaccine on days 3, 7, 14
b) HRIG AND rabies vaccine on days 0, 3, 7, 14
c) HRIG AND rabies vaccine on day 0 THEN rabies vaccine on days 3, 7, 14, 21
d) Single dose of each HRIG AND rabies vaccine within 7 days of exposure

RABIES

ETIOLOGY & EPIDEMIOLOGY

Rhabdovirus that infects the central nervous system

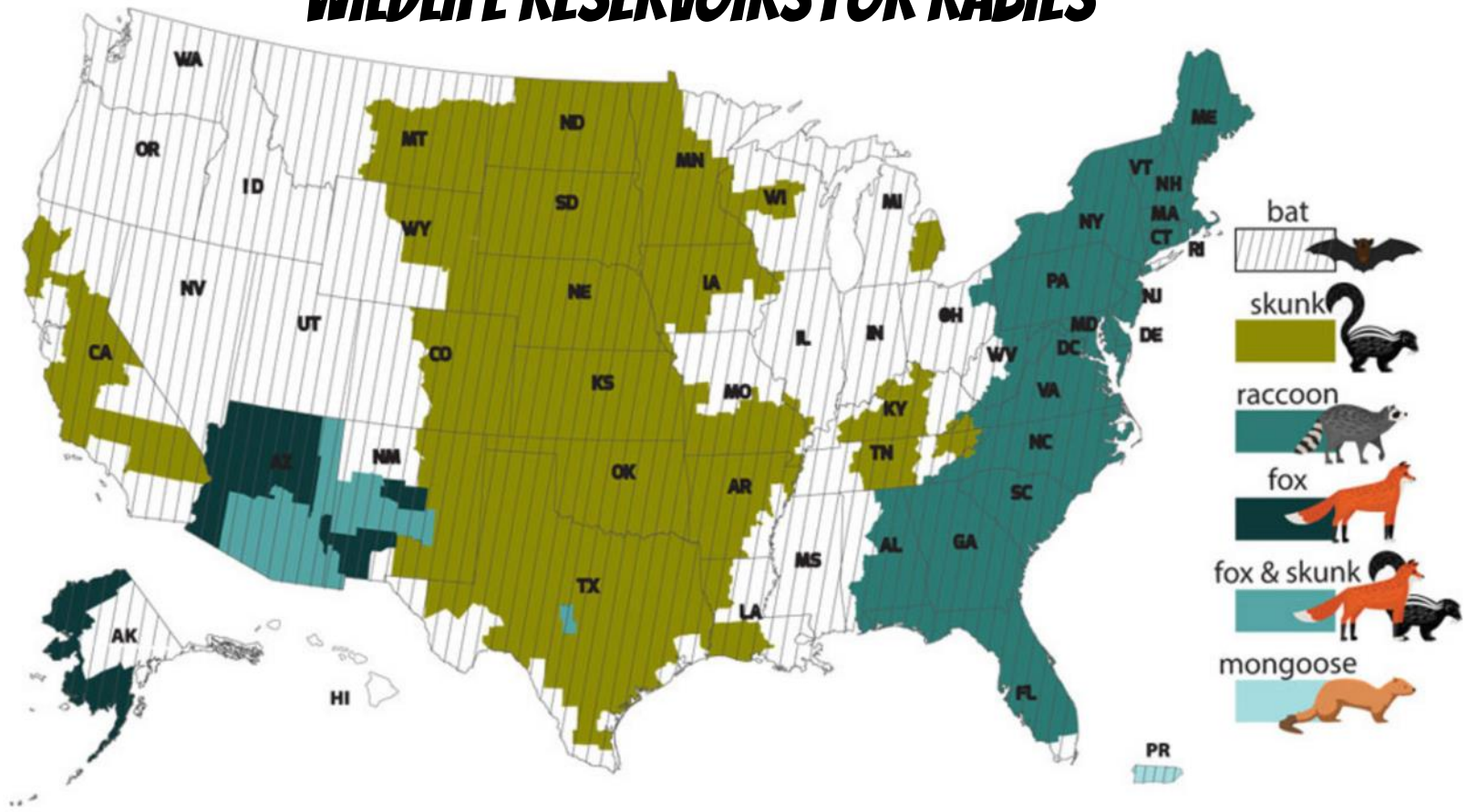
Transmission via saliva

Average incubation is 1-3 months

Highest fatality rate of any infectious disease

Only 1-3 human cases in US annually

WILDLIFE RESERVOIRS FOR RABIES



DISEASE MANIFESTATION & MANAGEMENT

Prodrome: **Pain, paresthesia, pruritus** at bite site

Encephalopathy, **Hydrophobia**, agitation, hypersalivation
Paralysis of diaphragm → death

Diagnostic lab testing sent to CDC
Perimortem **negri bodies** are pathognomonic

Supportive care, sedation, ventilation support
Immunotherapy, antivirals

Most will die within 2 weeks

EMERGENCY DEPARTMENT PRESENTATION

CC: "I think I was exposed to rabies"

Post exposure risk assessment:

Bite or saliva to open skin/mucous membrane from mammal that is:

× High-risk wild animal
× Low risk domestic animal unable to quarantine
× Domestic animal with rabies symptoms
× Bats – direct contact or asleep in room with bat

Domestic animal quarantine: 10 days

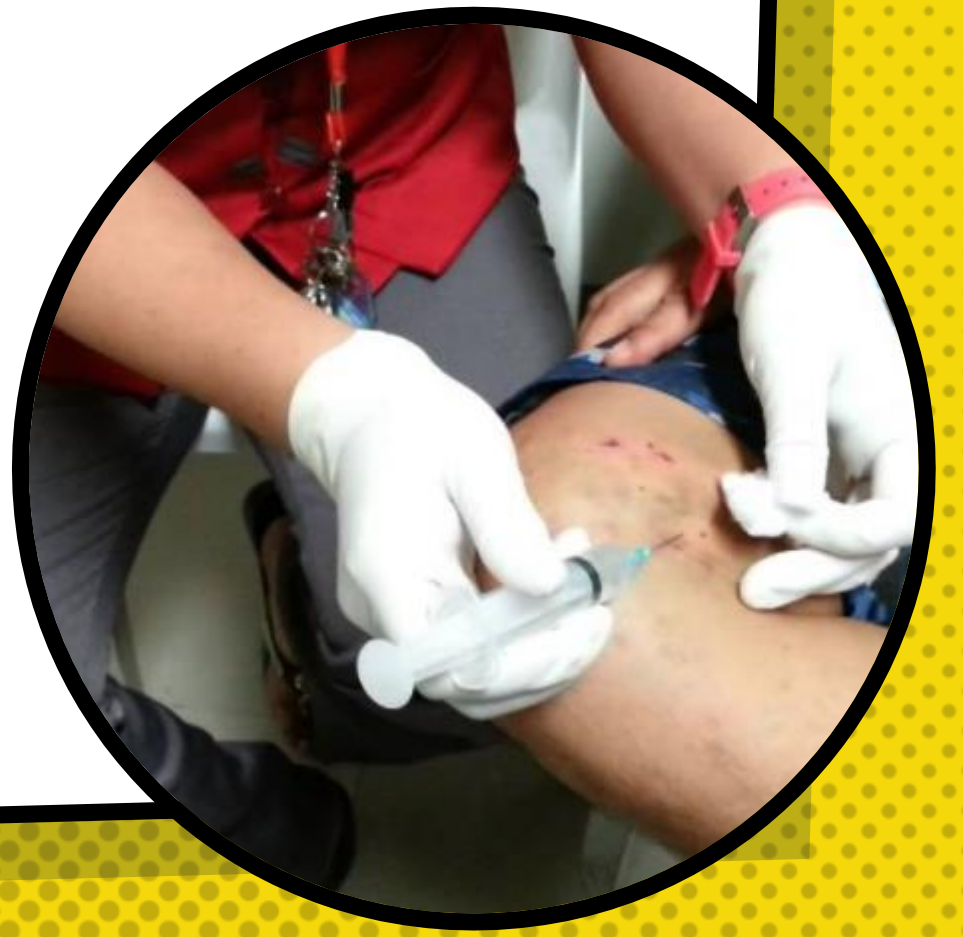
POST-EXPOSURE PROPHYLAXIS

Wound care: Soap + Water + Iodine

Human rabies immune globulin infiltrated at bite site

Vaccine (HDCC or PCEC) on days 0, 3, 7, 14

If previously immunized just wound care + vaccine on days 0 + 3



Rabies transmission is via **saliva** of an infected animal.

CDC's recommended rabies post exposure prophylaxis: **human rabies immune globulin & rabies vaccine on day 0** THEN **rabies vaccine on days 3, 7, 14**

CASE 3

Peter Parker & Natasha Romanoff present to the ED together each with triage note: “spider bite.”

2 days ago, Peter put on boots that had been in a closet all summer, felt a bite, and then saw a spider run away. Since then, he has developed malaise, myalgia, and notes a small dusky lesion with eschar on his foot.

Natasha was outside doing yardwork when she was bitten by a spider on her leg. About 30 minutes later she developed diffuse myalgia and abdominal pain.

WHICH OF THE FOLLOWING IS A CLASSIC SYMPTOM OF A BLACK WIDOW SPIDER BITE?

a) abdominal cramps
b) headache
c) hematuria
d) joint swelling

WHICH SYMPTOM WOULD YOU *NOT* EXPECT IN A PATIENT WHO SUSTAINED A BROWN RECLUSE BITE?

a) dermal necrosis
b) diaphoresis
c) malaise
d) myalgias

SPIDER BITES

BROWN RECLUSE

BLACK WIDOW

BROWN RECLUSE PRESENTATION, EVALUATION, & MANAGEMENT

Counterpressure required for a bite

3-4 hours of burning & stinging at bite site followed by blanching, red halo, and **ischemic center**.

1-3 days after bite: **bullae & eschar** +/- **systemic symptoms**

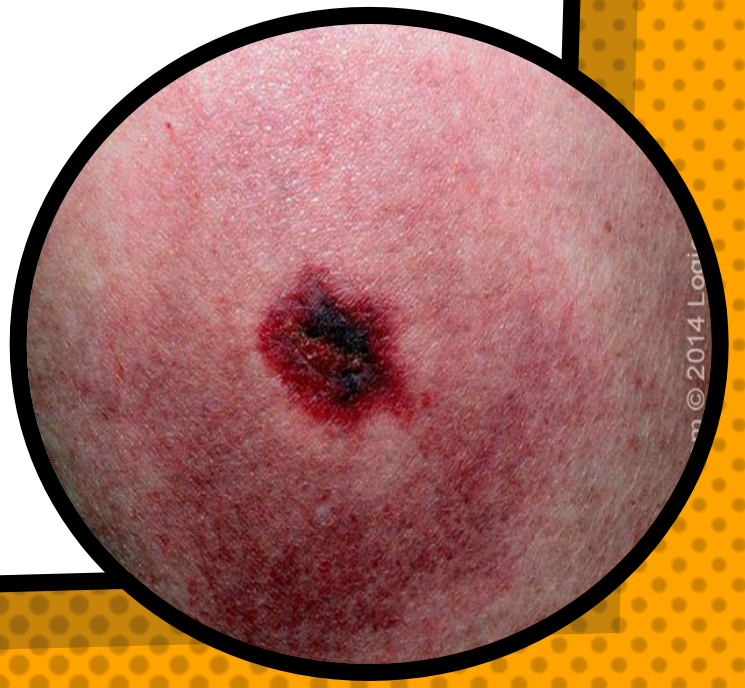
10% proceed to **tissue necrosis**

Wound care: soap & water, cold packs, elevate or keep neutral

Analgesia: NSAID or opiate

Tetanus

Debridement once necrotic lesion halts evolution



Black Widow Presentation, Evaluation, & Management

Symptoms 30 minutes – 2 hours after bite

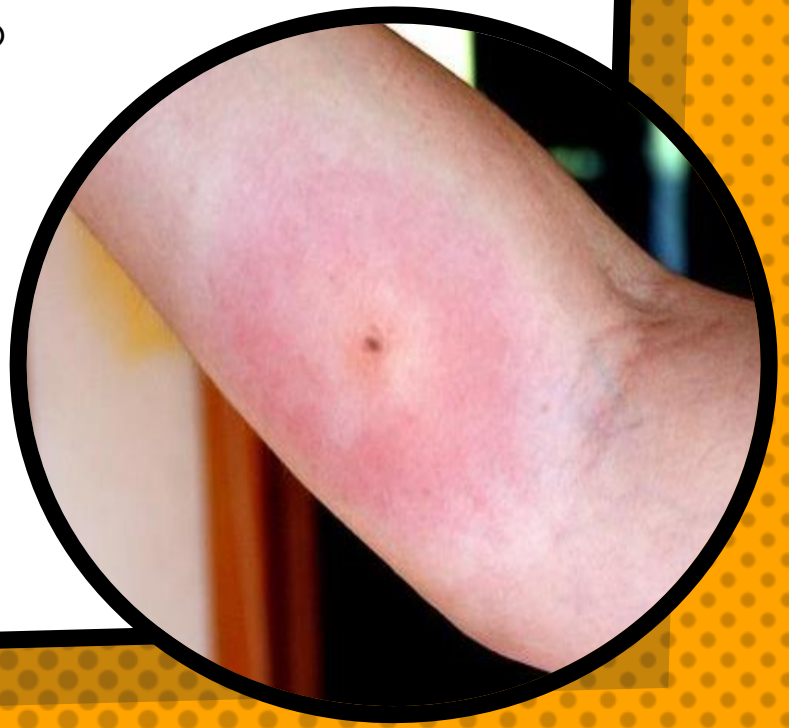
Mild Envenomation: local irritation, adjacent myalgia

Moderate envenomation: Spasm throughout bitten limb, spreading to back, chest, abdomen +/- diaphoresis

Severe envenomation: Severe pain, tachycardia, hypertension, Nausea/vomiting, headache

Mild Treatment: wound care, PO analgesia, PO benzo, tetanus
Moderate Treatment: wound care & tetanus, IV analgesia, IV benzo, antiemetic, consider antivenom

Antivenom has risk of anaphylaxis and black widow envenomation is rarely fatal



Abdominal pain is classic in Black widow bites.

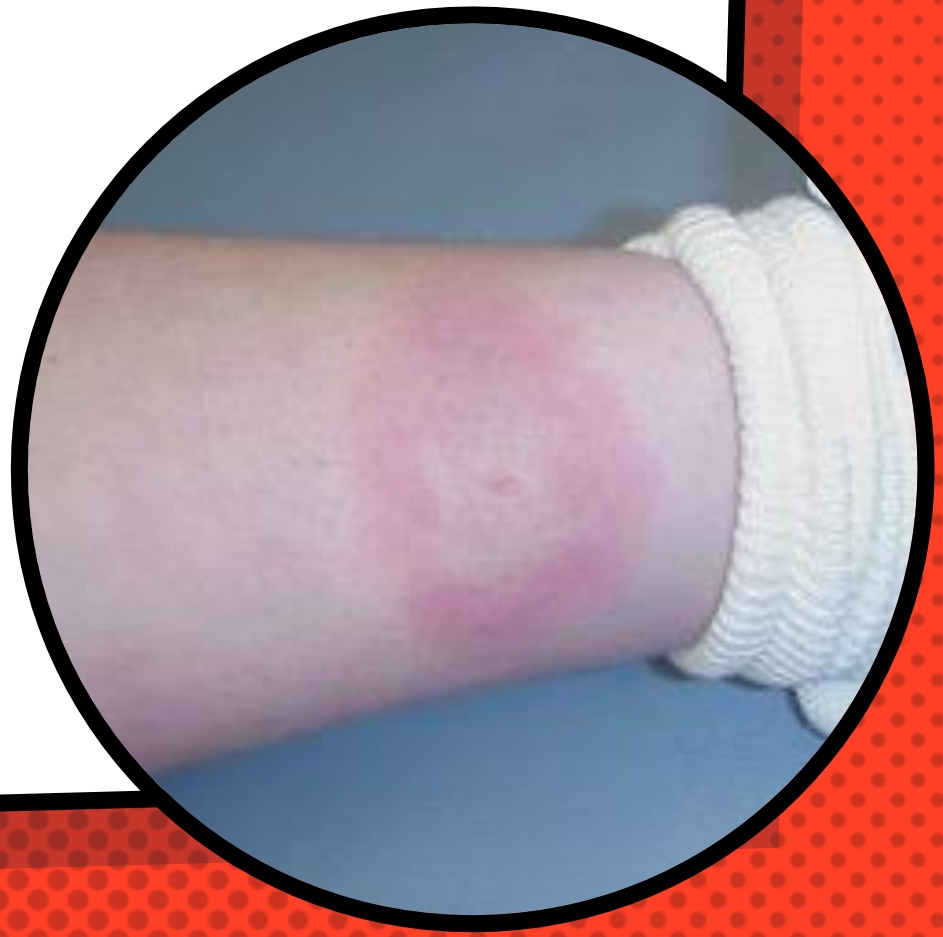
May also induce chest pain, diaphoresis, & restlessness mimicking **myocardial infarction!**

Brown recluse bites do **not** result in diaphoresis generally

CASE 4

Mr. Daley presents to the ED In late fall with 1 day of headache, myalgias, fatigue, nausea, and a rash on his leg.

2 weeks ago he went on a hiking trip in central NC. And remembers removing a few larger brown-colored ticks.



OF THE CONDITIONS LISTED, WHICH IS MOST LIKELY FOR THIS PATIENT?

a) Babesiosis
b) Rocky Mountain Spotted Fever
c) STARI
d) Tularemia

WHICH OF THESE TICK-BORNE ILLNESSES IS DOXYCYCLINE INEFFECTIVE FOR PROPHYLAXIS AND/OR TREATMENT?

a) Babesiosis
b) Rocky Mountain Spotted Fever
c) STARI
d) Tularemia

NON-LYME TICKBORNE DISEASE

THERE ARE LOTS OF TICKS. THEY DON'T ALL HAVE LYME.

AMERICAN DOG TICK

Tularemia & RMSF

BLACKLEGGED DEER TICK

Lyme, Anaplasmosis, Ehrlichiosis, Babesiosis

BROWN DOG TICK

RMSF

LONE STAR TICK

STARI, Tularemia, Ehrlichiosis

ROCKY MOUNTAIN SPOTTED FEVER

Rickettsia ricketsii

Vectors: **wood tick & dog tick**

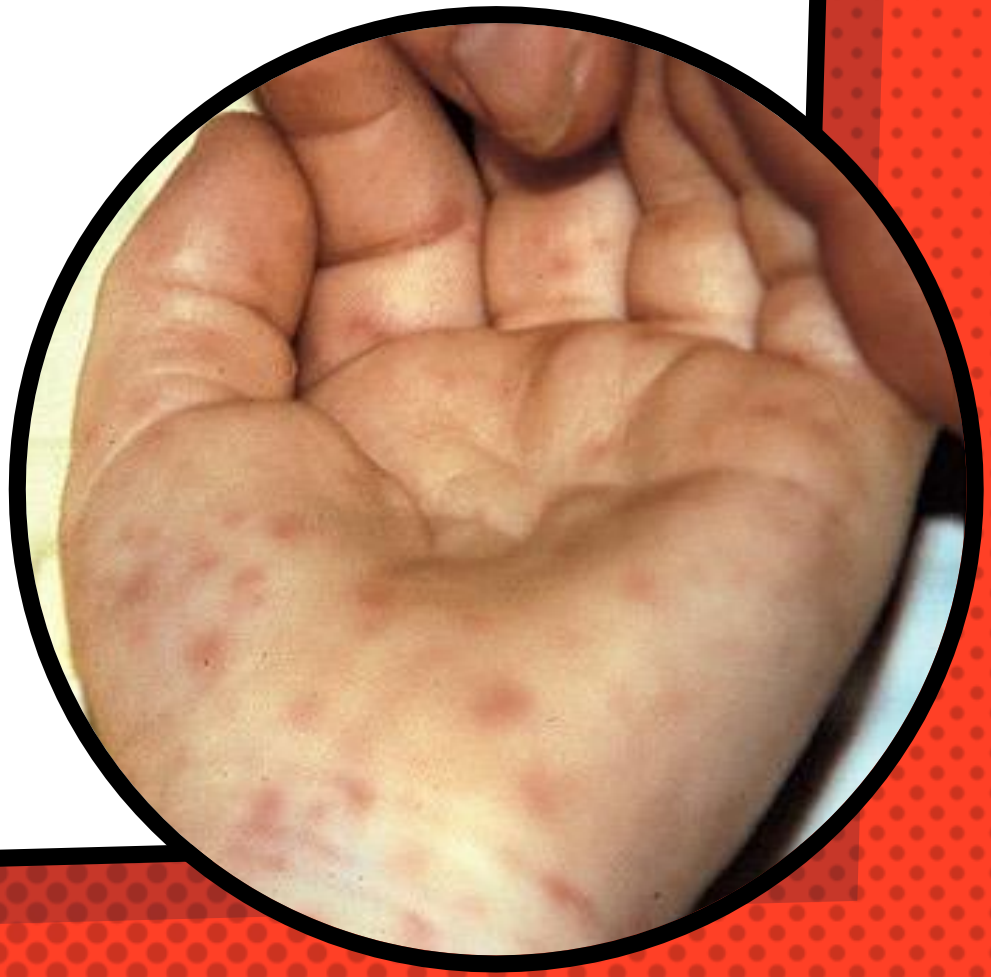
Early spring/summer

Incubation: 2 days -2 weeks

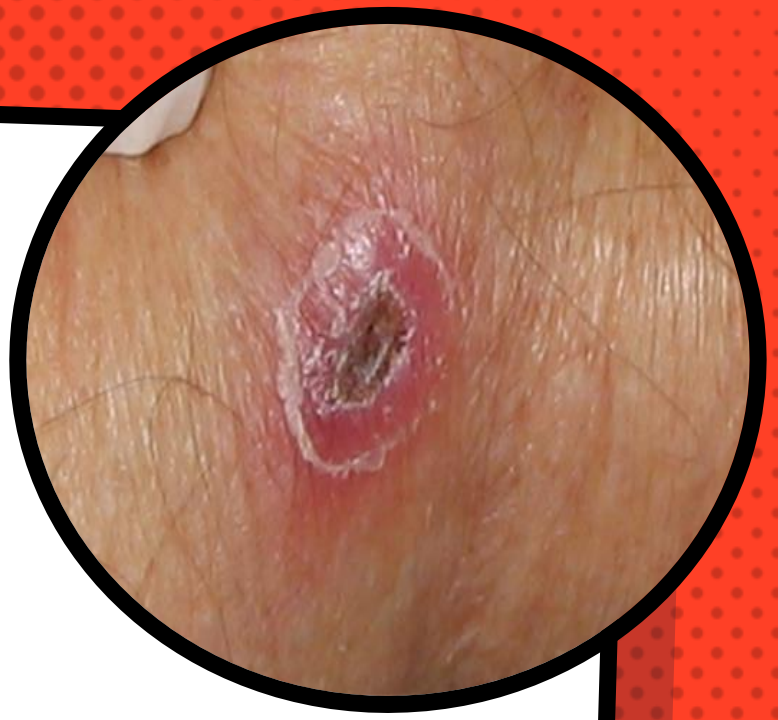
Constitutional & GI symptoms → **wrist & ankle rash**

Clinical diagnosis

Treatment: **doxycycline**



TULAREMIA



Francisella tularensis

Vectors: **tick**, **deer fly**, rabbits, water, farm dust

Incubation: 2 days -2 weeks

Ulceroglandular or glandular manifestations

Diagnosis confirmed w/ Serology & culture

Treatment: **Streptomycin** for severe. Cipro or Doxy for mild/moderate.

FUN FACT: CATEGORY A BIOTERRORISM AGENT!

STARI

Southern Tick Associated Rash Illness

Borrelia lonestari via the **Lone Star tick**

Erythema migrans type rash **12 days after bite**

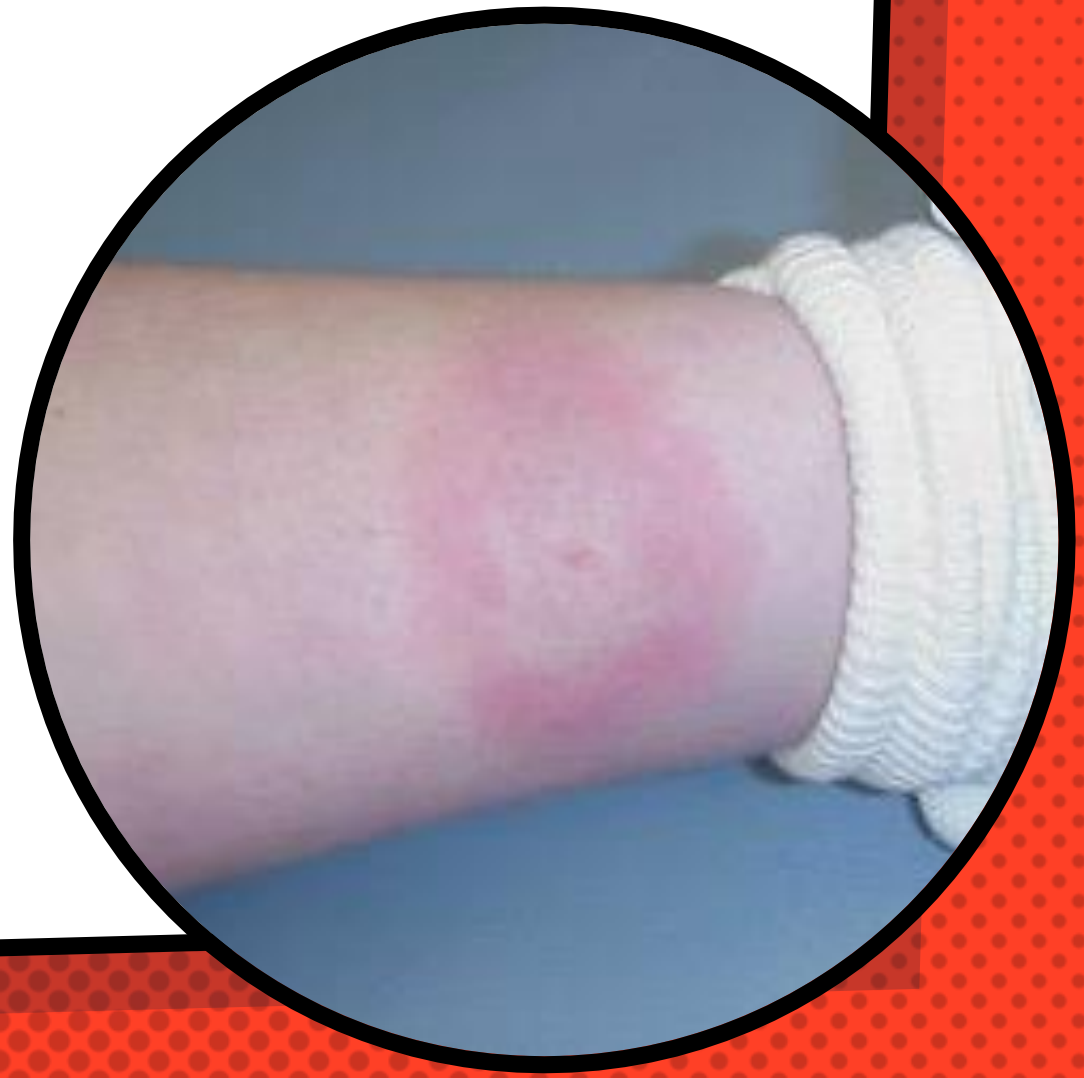
+/- constitutional symptoms

Multiple lesions possible

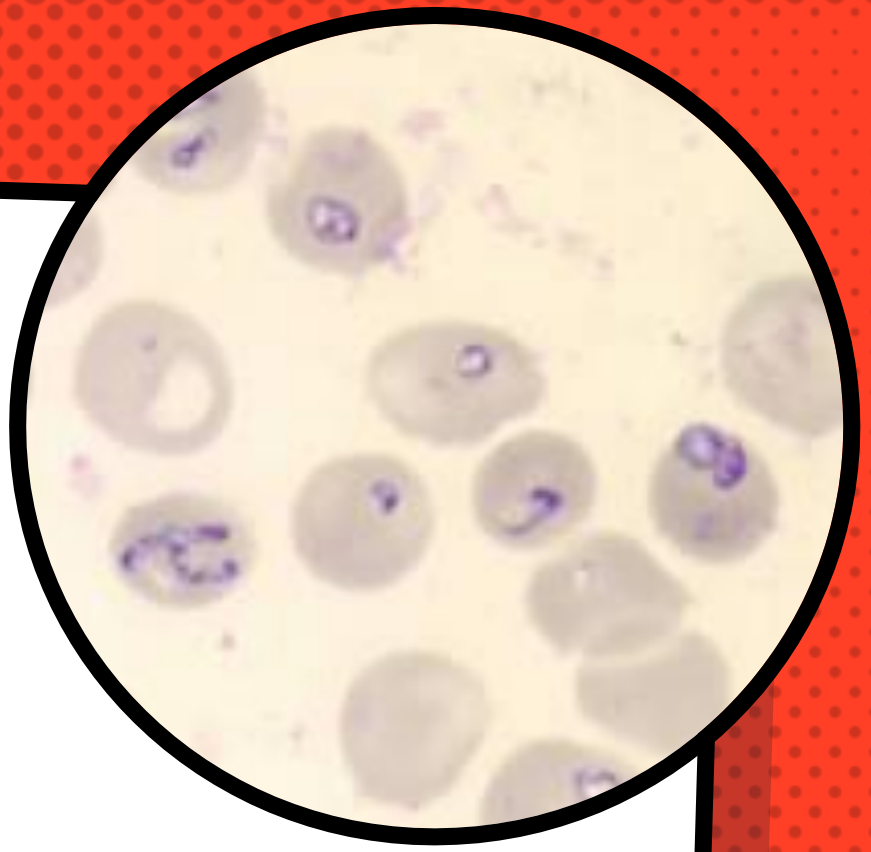
Clinical diagnosis

Treatment: **doxycycline**

Unclear role of post-bite prophylaxis



BABESIOSIS



Babesia microti → Hemolytic anemia

Vector: **Deer tick**

Incubation: 1-9 weeks

Diagnosed on peripheral smear

Mild to moderate disease: fatigue, malaise, +/-fever, parasitemia <4% → **PO azithromycin & atovaquone**

Severe disease: More severe symptoms +/- GI symptoms, parasitemia >4% → **IV azithromycin, PO atovaquone**, +/- exchange transfusion.

Include **STARI** on the DDx for erythema migrans in the Southeast US

Doxycycline is a good choice for most tick-borne illnesses **except Babesiosis**

CASE 5

Selena Kyle presents to the ED following a run-in with her neighbor's cat. Just prior to arrival she was walking her dog, stopped to pet the cat, & her dog barked prompting the cat to bite & scratch her right mid-forearm.

Deep puncture wounds & superficial excoriations were irrigated. Xray shows no retained tooth in the soft tissue. She confirmed both she & the cat are healthy, have no allergies, and are up to date on all vaccines.

WHICH OF SELENA'S CLINICAL FEATURES SHOULD PROMPT YOU TO INITIATE ANTIBIOTIC PROPHYLAXIS?

a) absence of retained radio-opaque foreign body
b) age of the injury
c) deep puncture due to cat
d) location of the injury

THE AVERAGE CAT BITE CULTURE YIELDS 5 BACTERIAL ISOLATES. IN ADDITION TO STAPH & STREP SKIN FLORA WHAT IS A CLINICALLY RELEVANT ORGANISM FOR CAT BITES?

a) Pasteurella
b) Pseudomonas
c) Salmonella
d) Vibrio

CASE 5…CONTINUED

About two weeks later, Selena returns to the ED with arm swelling, no other symptoms.

On examination, puncture and excoriation sites are healing without local erythema, induration, nor edema.

She has tender lymphadenopathy of the right epitrochlear and axillary nodes.

WHICH OF THE FOLLOWING ANTIBIOTIC REGIMENS IS MOST APPROPRIATE TO MANAGE SELENA'S CONDITION NOW?

a) Azithromycin x5 days
b) Bactrim DS x7-10 days
c) Rifampin PLUS doxycycline x4-6 weeks
d) Rifampin PLUS gentamycin x10-14 days

BARTONELLA & PASTEURELLA

PASTEURELLA FROM CAT BITES

Dog & cat bites make up 1% of all ED visits & cat bites more commonly infected

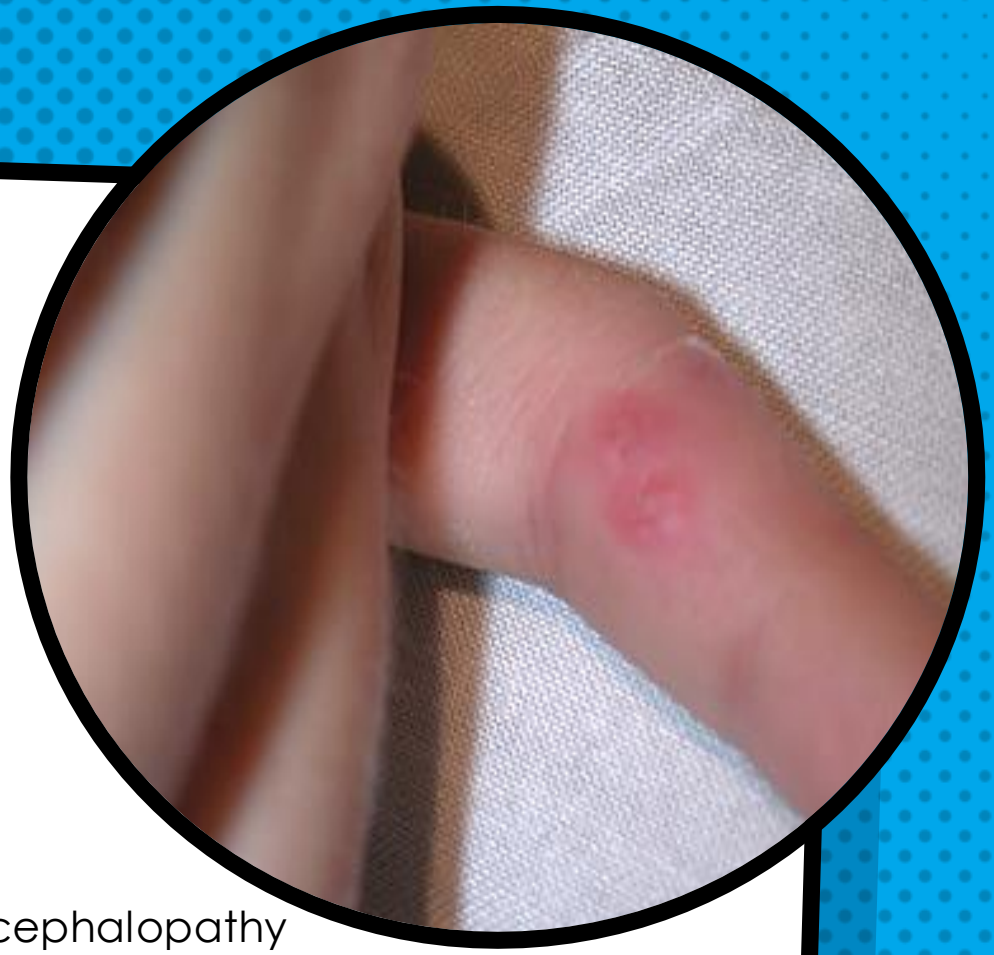
75% of cat bites have **Pasteurella multocida**

Wound care, rule out and remove foreign body, +/- tetanus, +/- rabies +/- antibiotics

Antibiotic prophylaxis with **Augmentin** if:

- ✕ Deep puncture
- ✕ Needs surgery
- ✕ Near a joint
- ✕ Immunocompromised
- ✕ Hands, face, genitalia

CAT SCRATCH DISEASE



Bartonella henselae

Local infection vs hematogenous spread

Transmission: Cat bite, scratch, saliva, or flea

Papular or vesicular lesion 3-10 days after bite
Tender lymphadenopathy 2 weeks after bite

Rare: Hepatosplenomegaly, FUO, ocular manifestations, encephalopathy

Clinical diagnosis confirmed with serology

Lymphadenitis: **Azithromycin**
Advanced disease: **rifampin + doxycycline** or **gentamycin**

Deep puncture wounds from a cat bite are high-risk features to prompt antibiotic prophylaxis.

Pasteurella is found in 75% of cat bites.

Azithromycin is preferred for Cat Scratch Disease Lymphadenitis

THANKS!

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REFERENCES

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