

Bites, Snakes, Jellyfish, and Other Envenomations

2012 Virginia EMS Symposium

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Objectives

- Address the morbidity and mortality of venomous creatures that reside in the Mid-Atlantic area
- Address the evaluation, stabilization and treatment of snake bites, jelly fish stings and other potential toxicological exposures that Commonwealth EMS providers may encounter
- Be able to identify by sight and presentation endemic organisms that can cause significant injury or death on the Mid-Atlantic region
- Be able to stabilize and appropriately transport various envenomation patients

Snakes

- Elapidae
 - *Micrurus* (Coral Snake)
- Viperidae
 - *Crotalinae*
 - *Crotalus* (W. Diamondback)
 - *Sistrurus* (Massasauga)
 - *Agkistrodon* (Copperhead)
- Exotics



The US Numbers

- 3,652 venomous snake bites in 2009
 - 3,541 Crotaline/Coral snake bites total
 - <6 y 151 exposures
 - 6-19 y 670 exposures
 - 23% \leq 19 y
 - Copperheads
 - 334 (23%) \leq 19 y
 - 3 deaths
- Exotics 41 (37%) \leq 19

Source: VPC



The US Numbers

- May to October, nocturnal at the peak of summer
- Remember the striking range $\frac{1}{2}$ of length of the snake
- Dead snakes can still bite if their jaw is stretched and envenomations have been documented



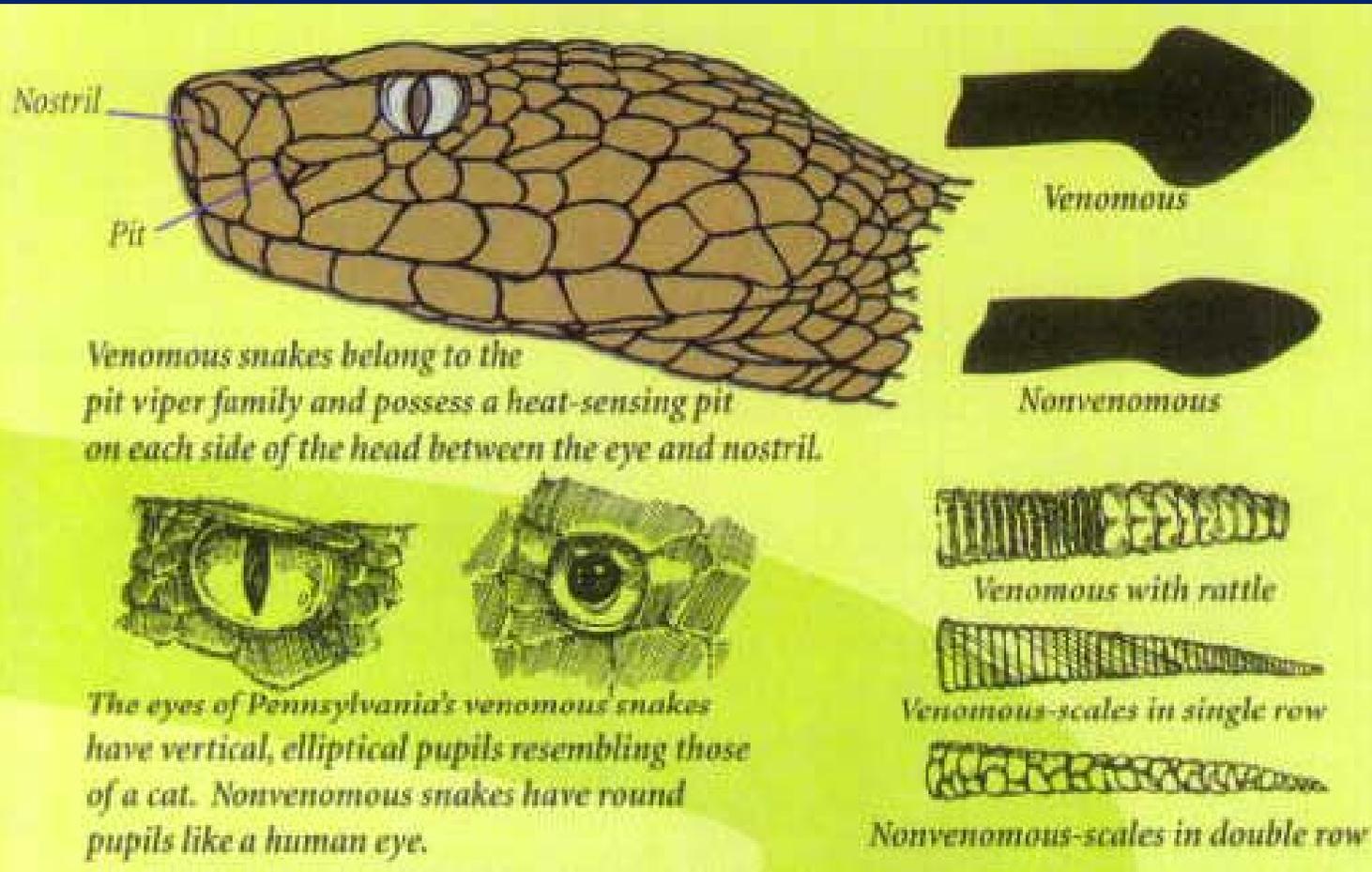
Crotalidae Envenomations

- 95% of bites in the US
- Triangular heads
- Eliptical eyes
- Pits nears nose
- Rattlesnakes, cottonmouths and copperheads
- E. Massasauga rattlesnake not near VA

Photos from:
[fcps.edu/islandcreekes/
ecology/copperhead.htm](http://fcps.edu/islandcreekes/ecology/copperhead.htm)



Crotalids



Source: VPC

Copperheads

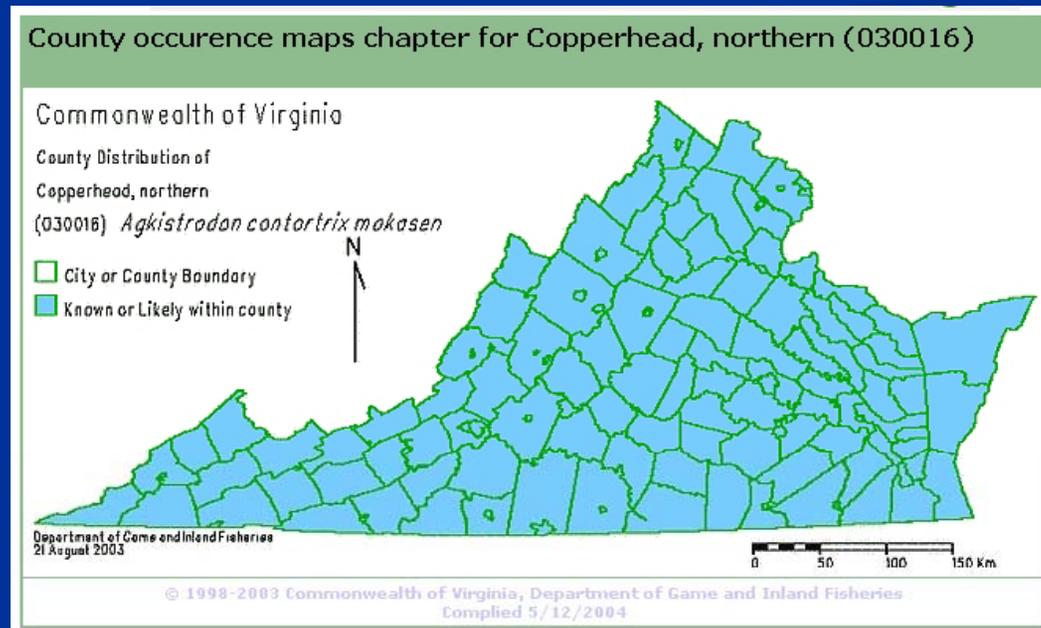
- Found in most habitats but prefer vegetation or debris – where their camouflage works best
- Remain motionless when threatened, so bites occur when they stepped on or molested
- Young may have a yellow tail



Copperheads

- Widespread here in Virginia
- Their large population and close proximity to humans is why they predominate in venomous snake bite statistics in the eastern US

Source: dgif.virginia.gov



Copperheads

- Walter et al (2012) analyzed trends in the annual rates of reported medical outcomes of US copperhead snakebites over 26 years in a retrospective analysis of medical outcomes
- The incidence rate of copperhead snakebites causing **no effect** significantly decreased by 12.1%/year



Copperheads

- Incidence rate of **minor outcomes** significantly decreased by 2.3%/year, whereas the rate of moderate outcomes significantly increased by 2.8%/year
- The rate of **major outcomes** did not significantly change
- Walter FG et al. South Med J. 2012 Jun;105(6):313-20



Cottonmouths

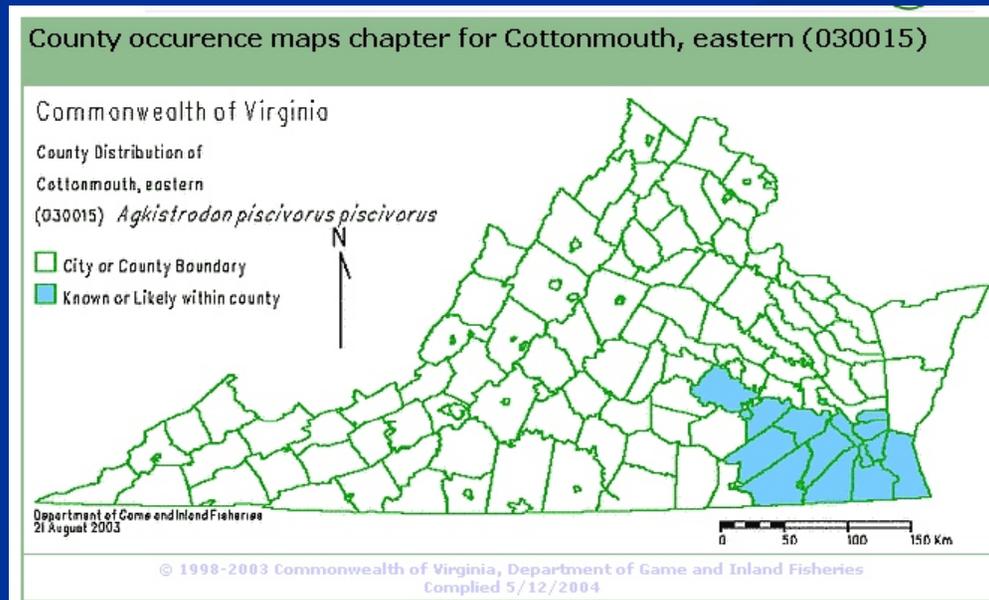
- Semi-aquatic snake found in cultivated fields near swamp or streams with an average length of 30-48”
- Not aggressive but if approached, it will stand its ground or slowly crawl away
- Swims with the entire body on the surface of the water versus other snakes



Cottonmouths

- None have been found north or west of Colonial Heights
- Known populations occur south of the James River

Pictures from redorbit.com and dgif.virginia.gov



Timber Rattlesnake

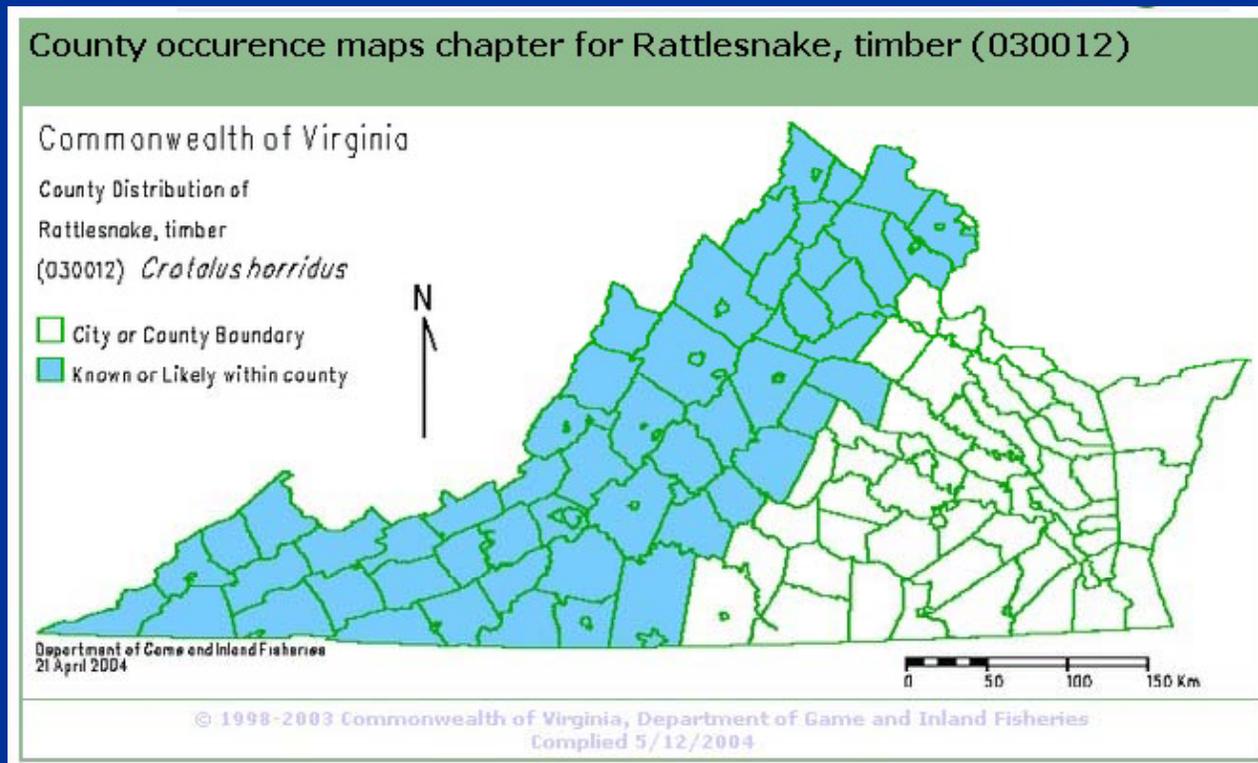
- Called the "banded" rattler and grows to lengths of 36-60"
- 2 major color patterns:
 - Yellow phase with black or dark brown cross-bands on a ground of yellow, brown, or gray
 - Black phase, in which the head is black and there are black blotches and chevrons on a ground color of dark brown to nearly black
- Often hibernate with copperheads and other snakes



Timber Rattlesnake

- Found in the Blue Ridge and in the western Piedmont
- Inhabits upland hardwood and pine-hardwood forests

Pictures from animalplace.net and dgif.virginia.gov



Canebrake Rattlesnake

- Differs from the timber rattlesnake - is pinkish to light tan with dark-brown to black blotches without the yellow and black phases
- Inhabits hardwood and mixed hardwood-pine forests, cane fields, and the ridges and glades of swampy areas in SE Virginia

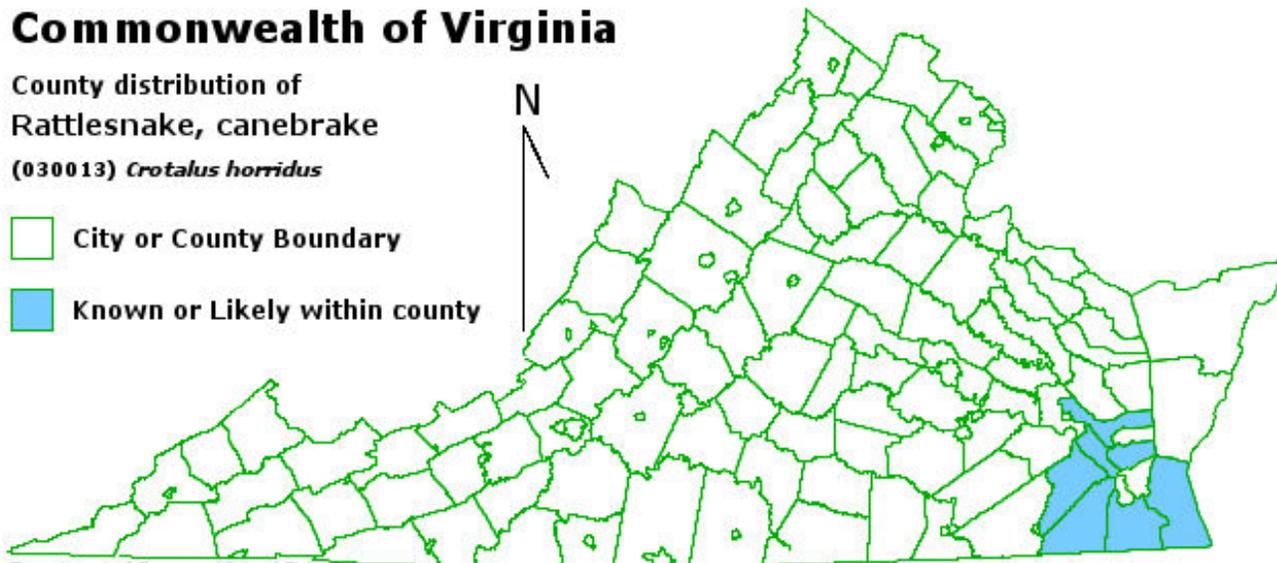


Pictures from dgif.virginia.gov

Commonwealth of Virginia

County distribution of
Rattlesnake, canebrake
(030013) *Crotalus horridus*

- City or County Boundary
- Known or Likely within county



Department of Game and Inland Fisheries
9 July, 2012

0 50 100 150 Km



The Bitten Victim

- Reassure the patient – the degree of envenomation and degree of injury varies
- A bite is classified as a “dry bite” if it causes little or no swelling and no laboratory abnormalities – need hours to determine this
 - Reported to occur in ~20% of all pit viper bites
 - Some speculation that immature snakes cannot control their venom release – may be worse than a larger adult

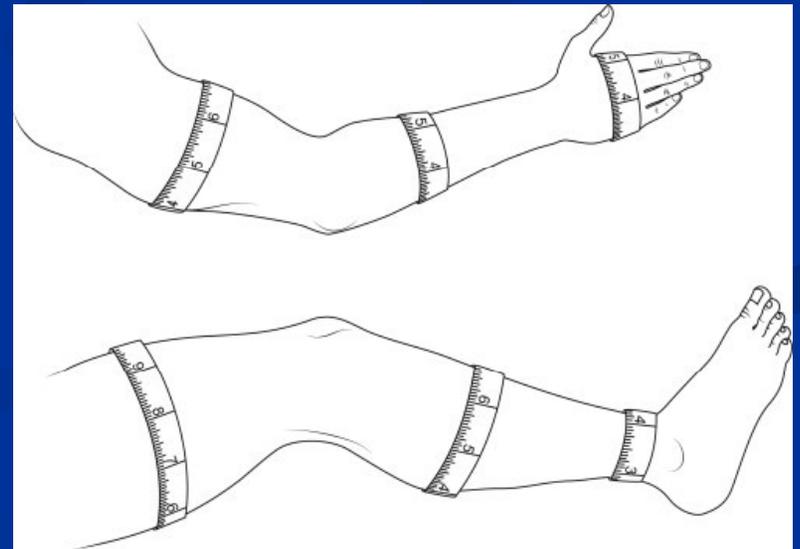
The Bitten Victim

- Pain control with opiates is the pre-hospital mainstay, but watch out for hypotension
- Antihistamines and corticosteroids have a limited role unless there are signs and symptoms of infection or allergic reaction



Evaluation and Stabilization

- The most valuable piece of information for suspected envenomation is a baseline measurement
 - Measure degree of swelling or eccymosis in the limb
 - Outline redness or eccymosis on the trunk
- In the ED and inpatient services, the affected extremity will be measured at 3 sites every 30 minutes initially to assess for worsening swelling and to determine the necessity for anti-venom treatment
- 2% to 8% of pit viper bites develop compartment syndrome



Quan D. *Crit Care Clin.* 2012 Oct;28(4):633-59.

The Bitten Victim

- Limb positioning is controversial and there is no evidence on what position the affected limb should be placed
 - Elevation in crotalid bites should help with the swelling known to occur
- Watch for compartment syndrome in older bites!
- Constricting bands, tourniquets and the pressure immobilization technique are thought to reduce venom travel in the extremity to prevent worsening symptoms, but the risk of tissue damage from the constricting band may cause more harm than benefit



Marking the Area REALLY Helps



■ Courtesy of VPC

Pre-Hospital Care

- Immobilize affected limb in a position of comfort with mild elevation
- Transport to appropriate level of care, keeping in mind that dry bites are in the minority and most patients need some period of observation
- Usually ethanol and stupidity is involved, so be prepared to convince people to get treated

Pre-Hospital Care

- What NOT to do:
 - Tourniquets
(constricts blood flow)
 - Heat or ice application
(worsens vascular regulation)
 - Sucking out venom
(Yuck)
 - Cutting and suction
(Doesn't work)
 - Drinking more beer
(Increases coagulopathy)

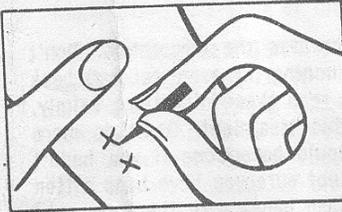
Picture courtesy of VPC

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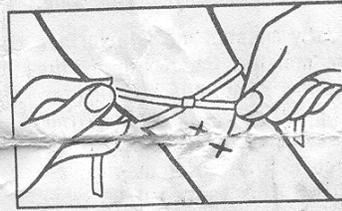
CUTTER

Compak Suction Snake Bite Kit

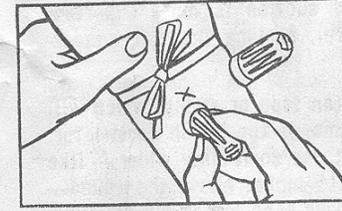
EMERGENCY DIRECTIONS



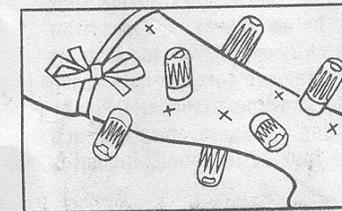
1. Push point of blade out of red sheath. Paint knife blade and fang marks with the antiseptic from glass vial.



2. Make cross incisions at fang marks $\frac{1}{4}$ inch long (—) and $\frac{1}{8}$ inch (—) deep.



3. Tie the red string (lymph constrictor) $1\frac{1}{2}$ inch above the bite. **NOT TOO TIGHT**—only sufficient to dent the skin.



4. Squeeze suction cup and apply it over bite.

CONTINUING EMERGENCY TREATMENT:

Apply all the suckers available. Make plenty of incisions — 50 or 100 are not excessive. Remove lymph constrictor for 1 minute every 10 minutes. Reapply slightly higher.

Copperheads: Even the Surgeons Agree Now

- Walker et al examined 142 snakebites presented to Texas Level III trauma center, from 1995-2010:
 - 88 copperhead bites
 - Most common presenting symptoms were pain and swelling
 - 85% were of grade 1 envenomations
 - None received antivenom or surgical intervention
- They conclude accurate identification of the pit viper species involved in snakebites is essential and that a bite by a copperhead (*Agkistrodon contortrix*) rarely requires any intervention other than observation
- Walker JP et al. J Am Coll Surg. 2011 Apr;212(4):470-4.

Envenomation in General

- Are highly species-specific
- Crotalid venom is usually local (swelling, pain, bleeding) as opposed to elapid, which is a systemic venom (paralysis, respiratory difficulty)
- Anti-venoms can neutralize:
 - Polypeptides
 - Proteolytic enzymes
 - Glycoproteins
 - Vasoactive substances



Classifying Envenomation

■ Russel Classification:

- **Minimal:** local swelling and/or blistering, bleeding; no systemic, normal labs
- **Moderate:** swelling progression beyond the bite site, mild systemic effects (*N/V/F/C, numbness, muscle cramps/fasciculations, metallic taste*) and 1 or more lab abnormalities
- **Severe:** Marked local response, severe systemic effects and significant laboratory abnormalities

Classifying Envenomation

- Remember that elapid and crotalid envenomations are different, so the previously discussed rating system therefore does not apply to elapids



US Anti-venoms

- Crotalid
 - ACP Polyvalent (horse serum) – preferred agent
 - Crofab Polyvalent Fab (sheep)
- Elapids
 - North American Coral Snake Antivenin (Wyeth-Ayerst) for: eastern coral snake (*Micrurus fulvius*) and Texas coral snake (*Micrurus tener*) is discontinued (horse serum)
- Black Widow Spider made by Merck (horse serum)
- Centruroides (scorpion) Immune (Anascorp, Rare Disease Therapeutics) – horse serum

Crofab

- Works on
 - Eastern and Western diamondback
 - Cotton mouth
 - Mojave rattlesnake
- Lower incidence of immune reaction ~15% (versus 30% with equine anti-venom)
- Reduces the incidence of compartment syndrome
- **If you suspect significant envenomation, transport to a facility that you know has anti-venom**

CroFab

- 400 retrospective chart reviews, 32 (8%) got crofab
- Rapid initial response 88% but 13% “failures”
- Recurrent swelling not reduced by scheduled doses
- 1 late onset coagulopathy 36 h later and 1 ? allergic reaction

Source: VPC



Crofab

- More recently, Lavonas et al examined the short-term outcomes with the use of Crofab for severe bites
- A multicenter, observational case series of patients who received Crofab at 17 US hospitals
- 209 patients, of whom 28 had “severe” envenomation
- All improved after receiving Crofab
- Immediate hypersensitivity reactions: 6.1%, serum sickness: 5%
- Crofab therapy was associated with clinical improvement in severe crotalid envenomation
- Immediate hypersensitivity and serum sickness rates were less than described in the prescribing information

Crofab

- The dosage depends on the snake:
 - Timber Rattlesnake/ Cottonmouth: 2 vials q 6h x 3
 - Copperhead: only necessary if systemic or severe local findings
- When in doubt CALL VPC!!!!



Anti-venom Risks

- IgE mediated allergic reactions are the most well known reactions, but don't occur often
 - Have to had prior exposure (prior bites)
- Class C in pregnancy
- But can also have a serum sickness (IgG mediated) weeks after administration
 - Urticaria
 - Myalgia



A Quick Word about Exotics

- Can literally come from anywhere in the world
- Anti-venom is useless without proper ID
- Nearest anti-venom repository is Miami
- It is therefore paramount that you bring in the snake (preferably dead) for identification



Found in VA



© John White

Found in VA

- Eastern hog-nosed snake (20 – 33”) is found all over VA (top)
- Not venomous, but can be confused with a venomous species (note shape of head)



Found in VA



Fakers Found in VA

- Common water snake
- Can be confused with the diamond back, but note the shape of the head



Found in VA

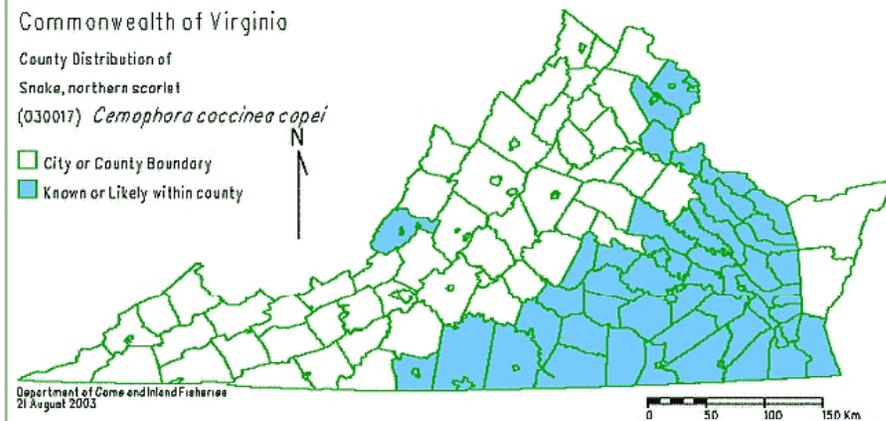


Fakers found in VA

- Northern scarlet snake (14 – 20")
- Mimics the coral snake (*Micrurus fulvius*), which does not occur in VA



County occurrence maps chapter for Snake, northern scarlet (030017)



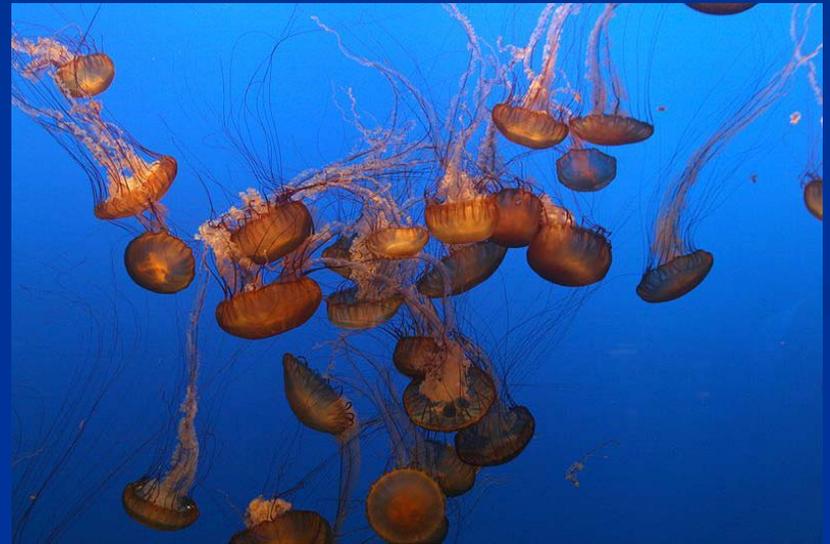
Jellyfish

- Jellyfish season is from May to October
- Weather conditions help determine how many appear in the Chesapeake Bay and Atlantic
- Moon jellyfish grow to 12” in diameter and lion's mane jellyfish, that typically appear from November to May



Jellyfish

- The region's most common jellyfish is the sea nettle
 - An umbrella-shaped 4” orb
 - Grows up to 24 tentacles
 - Sting produces painful rashes and welts but is rarely life-threatening
- Also found at the mouths of the Potomac, James, York and Rappahannock Rivers



Jellyfish Treatment

- Soak or rinse in vinegar for 15-30 m to neutralize nematocysts
- Can also use sea water or isopropyl alcohol
- Do not use fresh water, apply heat or ice (will cause the nematocysts to fire)
- Remove tentacles with a stick or a pair of tweezers
- Consider using shaving cream or baking soda, which will neutralize the nematocysts, then shaving the area with a razor or credit card
- Eye stings should be rinsed with a commercial saline solution



Portuguese Man O'War

- Usually subtropical but dead ones can sometimes land on the beach (dead ones can still sting)
- Severe pain with whip-like, red welts that last 2 or 3 days
- Fever or shock can also occur but death is rare
- **DO NOT** use vinegar (may increase toxin delivery and worsens symptoms) as this venom is different from real jellyfish

Images from CMJ



Hymenoptera

- Bees, ants, and wasps – all have stingers that can cause local reactions or anaphylaxis in susceptible individuals
- Wasps are not bees - can sting multiple times because their stingers are smooth and retractable, as opposed to bees
- “Killer Bees” are a hybrid between European honeybees and African bees
 - They have worked their way up into the US from the South America and migration continues to spread northward each year
 - Aggressively defend their nests
 - Patchy sightings in VA



Hymenoptera

- Ants of interest are the black (*Solenopsis richteri*) and red imported fire ant (*Solenopsis invicta*)
- Have spread rapidly through the US
- Envenomation is through a stinger at the caudal end of the abdomen
- Venom effects depend on the amount injected, number of stings, and the host's immune system reaction
 - Local reactions most common
 - Life-threatening anaphylaxis (needs previous exposure)



Hymenoptera

- Depending on the species, a significant number of hybridized bee stings is ~50
 - Patients with >50 stings should be observed for up to 24 hours, as delayed systemic problems can occur 8 to 24 h after the sting
 - 500 bites may kill child
 - 1000-2000 bite may kill adult
 - Watch for elderly, cardiac disease
- The median lethal dose from honeybee envenomation is estimated through animal models to be 19 stings/kg (Quan, 2012)

Hymenoptera

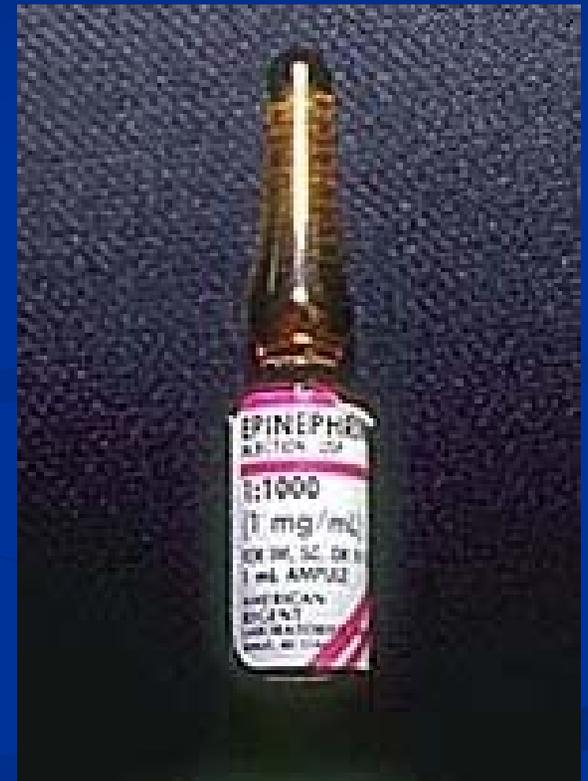
- Removing stingers quickly by any method results in less venom injected into the wound
- Look out for systemic signs and symptoms consist of nausea, vomiting, abdominal pain
- Type III hypersensitivity may occur in those patients with significant envenomation (joint pain, fever, swelling, and rash)
5 to 10 days after insult

Photo: bee-stings.net/remove_a_bee_stinger.htm



Treatment for Allergic Reactions

- Don't forget to start with the ABC's
- Diphenhydramine 1 mg/kg PO/IV
- Steroids of your choosing
- Albuterol nebs
- Epinephrine
 - IM: 1:1,000: IM 0.01 mL/kg
 - IV: 1:10,000: 0.1 in 10 mL of NS
- Epi Pen (0.3 mL)
- Epi Pen Jr. (0.15 mL)



Lactrodectus Spiders

- Black widow is frequently encountered in this area
- 2,302 Cases in 2009
 - 493 (21%) \leq 19 y
- No documented deaths since 1950's

Source: VPC



Lactrodectus Spiders

- Starts on extremities
- Initial bite \pm painful, target lesion
- Rapid progression within 15 min-1 hour
- May develop hypertoxic myopathic syndrome
 - Muscle cramps/fasciculations of chest, trunk, face
 - May recur for several days
 - Transient muscle spasm, weakness for weeks

Lactrodectus Spiders

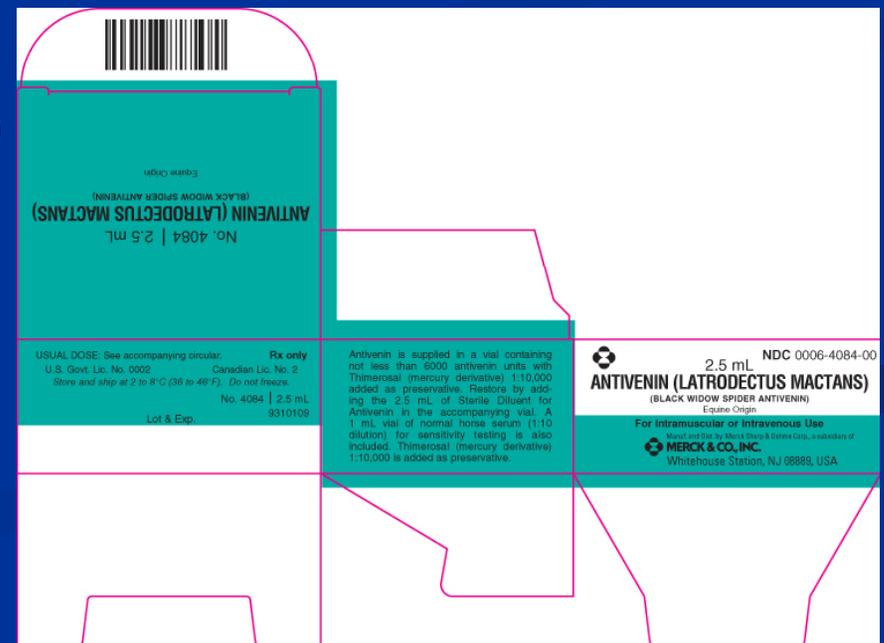
- The venom opens Ca channels - is a neurotoxin
- Serious envenomations cause hypotension, coma, respiratory paralysis
- But usually present with:
 - Nausea, vomiting, sweating
 - Weakness, hyperparathesias, hyper-reflexia
 - Seizures, tremor
 - Arthralgias
 - Restlessness
 - Salivation, wheezing, runny nose



Lactrodectus Spiders

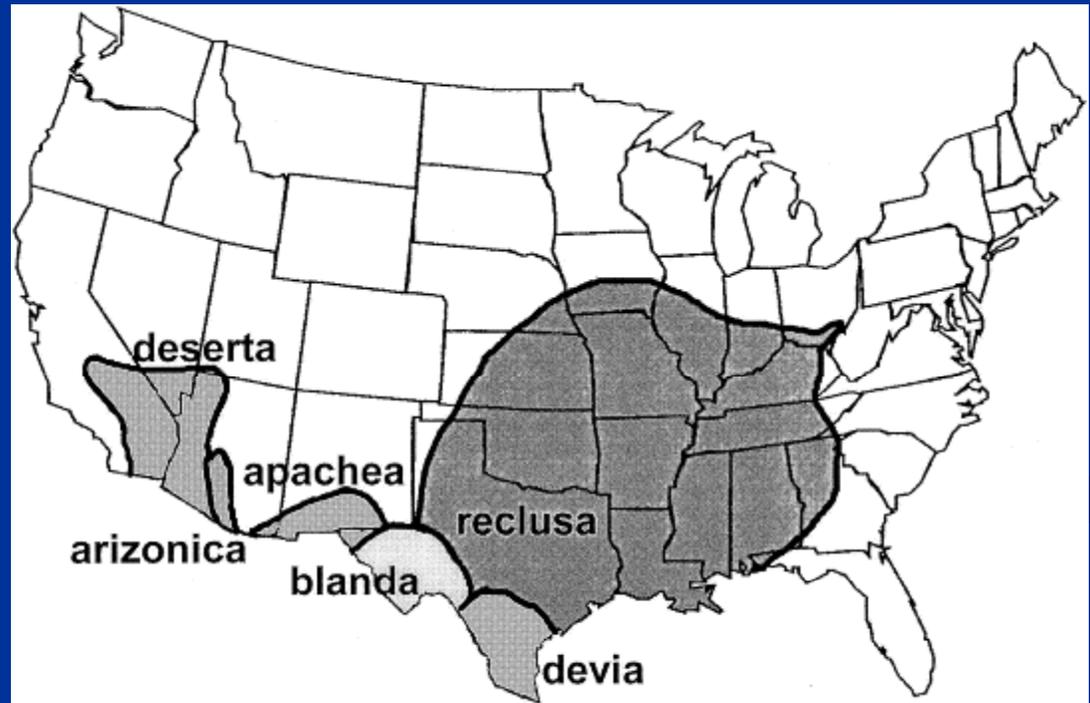
- Most often, offending spider not identified
- Anti-venom is the treatment of choice in moderate to severe cases – can completely reverse symptoms in 1/3 of patients
- So treat presumptively
 - Pain control (opiates, benzos)
 - Watch respiratory status
- Calcium not so efficacious

Clark RF: Annals Emerg Med 1992;21:782-787



Loxosceles Spiders

- Various Loxosceles species throughout the world
- In the US, *L. reclusa* is closest to VA
 - Is very reclusive
 - Seldom seen
 - Bites when trapped
 - Popular diagnosis
 - Dark, dry places



Loxosceles Spiders

- At initial onset, severe pain
- 24 h later, erythema, blister
- Later, necrosis
- Sometimes has a band of vasoconstriction
- Lots of treatments
 - But they all are harmful



Scorpions:

Centruroides exilicauda and sculpturatus

- In 2009, 17,154 cases reported, 99.999999% of which occurred outside the Commonwealth
 - 4,978 (29%) ≤ 19 y
 - AZ, NM, NV, CA, Mexico
- Will not address further

Source: VPC



Ticks:

Rocky Mountain Spotted Fever

- *Rickettsia rickettsii*, an intracellular bacterium
- It's nasty...despite the availability of effective treatment and advances in medical care, approximately 3% to 5% of individuals who become ill with RMSF still die from the infection



Rickettsia rickettsii

RMSF

- Tick bite recalled in only about 70% of patients
- Tick can be attached for less than 1 day
- Antibiotic therapy has dramatically reduced the number of deaths: before the discovery of tetracycline and chloramphenicol, as many as 30% of persons infected with *R. rickettsii* died



RMSF

- Over 90% of patients are infected during April through September (the season of highest numbers of *Dermacentor* ticks)
- Frequency of RMSF is higher in the South, Caucasians, and children



RMSF

- 2/3 of the Rocky Mountain spotted fever cases occur in children under the age of 15 years, with the peak age being 5 to 9 years old
- Cause a necrotizing vasculitis
- Fever always present
- Incubation is 2 to 14 days



RMSF: Symptoms

- Incubation period of about 5-10 d after a tick bite
- Early clinical presentation are nonspecific and may resemble a variety of other infectious and non-infectious diseases
- Early (macular) rash on sole of foot
- Fever, N/V, severe headache, muscle pain, anorexia
- The classic triad of findings for this disease are fever, rash, and history of tick bite but may not always be present



RMSF: Symptoms



- The rash first appears 2-5 days after the onset of fever and is often not present or may be very subtle when the patient is initially seen
- Younger patients usually develop the rash earlier than older patients
- Most often rash begins as small, flat, pink, non-itchy spots (macules) on the wrists, forearms, and ankles

RMSF: Symptoms

- The characteristic red, spotted (petechial) rash of RMSF is usually not seen until the 6th day or later after onset of symptoms, and this type of rash occurs in only 35% to 60%
 - Involves the palms or soles in as many as 50% to 80% but this distribution may not occur until later in the course of the disease
 - 10% to 15% of patients may never develop a rash
 - Moves towards trunk after 6 to 12 hours
 - These spots turn pale when pressed and then become raised on the skin



RMSF: Symptoms

- Neurological problems too:
 - Headache to seizures to coma in about 1/3 patients
 - Focal neurological deficits also possible
- Later signs and symptoms include abdominal pain, joint pain, and diarrhea



RMSF: Treatment

- If the patient is treated within the first 4-5 days of the disease, fever generally subsides within 24-72 h
- Failure to respond to an antibiotic argues against a diagnosis of RMSF
- Severely ill patients may require longer periods before their fever resolves
- Preventive therapy in non-ill patients who have had recent tick bites is *not* recommended and may, in fact, only delay the onset of disease

Southern Tick-Associated Rash Illness (STARI)

- A rash similar to the rash of Lyme disease has been described in humans residing in southeastern and south-central states and is associated with the bite of the lone star tick, *Amblyomma americanum*
- This Lyme disease-like rash has been named Southern tick-associated rash illness (STARI)

Southern Tick-Associated Rash Illness (STARI)

- Ticks are found through the SE and south-central states
- Even though spirochetes have been seen in *A. americanum* ticks by microscopy, attempts to culture it in the laboratory have consistently failed
- However, a spirochete has been detected in *A. americanum* by DNA analysis and was given the name *Borrelia lonestari*



Southern Tick-Associated Rash Illness (STARI)

- Persons living or traveling in southeast or southcentral states who develop a red, expanding rash with central clearing (the rash of Lyme disease, erythema migrans) following the bite of the lone star tick, *A. americanum*
- Therefore purely a clinical diagnosis that must have an identified tick



Tick Paralysis

- Ascending paralysis from tick bite
- Look closely in all creases and nooks
- Ach blockade at NMJ
- Mostly in SE, SW US
- 43 different tick species
- 4 to 7 days after attachment
- Can also have tick ataxia – cerebellar symptoms without paralysis
- Also consider: GB, Eaton-Lambert, MG, polio, botulism
- Remove the tick, it goes way within 48 h

Lyme Disease

- *Borrelia burgdorferi* transmitted to humans
- 23,000 infections in 2002
- Black-legged ticks (*I. scapularis*) in the NE and north-central US. (*I. pacificus* on the Pacific Coast)
- Transmit infection after feeding for 2 d



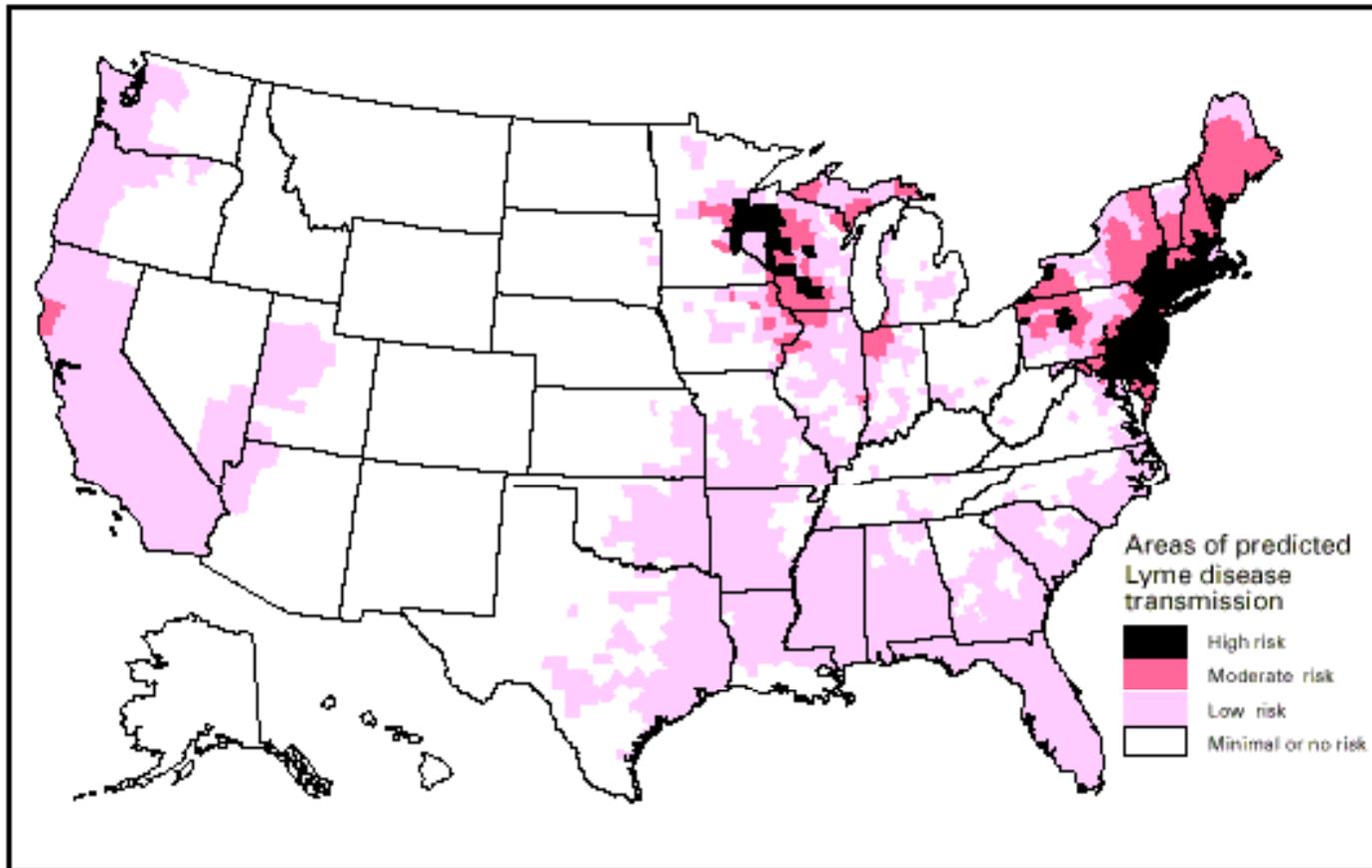
Lyme Disease

- May to August is peak time
- Mostly localized to states in the NE and upper north-central US regions
- 95 percent from CT, DE, RI, ME, NH, NY, PA, and WI



Lyme Disease

National Lyme disease risk map with four categories of risk



Note: This map demonstrates an approximate distribution of predicted Lyme disease risk in the United States. The true relative risk in any given county compared with other counties might differ from that shown here and might change from year to year. Risk categories are defined in the accompanying text. Information on risk distribution within states and counties is best obtained from state and local public health authorities.

Lyme Disease

- Stage 1: viral
 - 25% with characteristic rash
 - 50% with a non-focal rash
 - Headache, fever, myalgias
 - Splenomegally
- Incubation period from infection to onset of erythema migrans is typically 7 to 14 days but may be as short as 3 days and as long as 30 days

Lyme Disease

- Characteristic "bull's-eye" rash
- May be accompanied by nonspecific symptoms such as fever, malaise, fatigue, headache, muscle aches, and joint aches
- Asymptomatic infection (determined by serological testing), or manifested by only non-specific symptoms such as fever, headache, fatigue, and myalgias



Lyme Disease: Stage 2

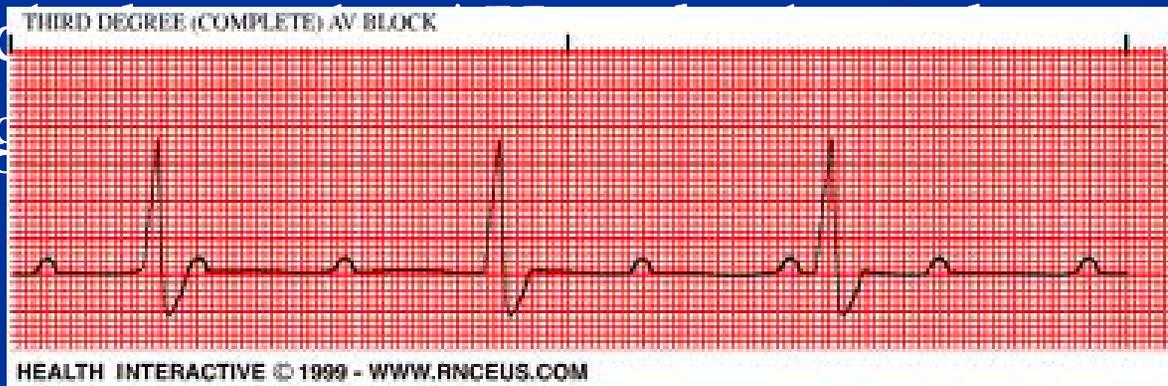
- 15% of all patients
- Secondary to dissemination of organism
- Signs of early disseminated infection occur days to weeks after the appearance of erythema migrans
- Manifests mainly as disease of the nervous system, but also musculoskeletal system or heart

Lyme Disease: Stage 2

- Early neurologic manifestations include lymphocytic meningitis, cranial neuropathy (especially facial nerve palsy), and radiculoneuritis
- Most frequent neurological presentation is meningoencephalitis accompanied by peripheral nerve palsies
- Often confused with viral meningitis, HSV meningitis, G-B

Lyme Disease: Stage 2

- Cardiac manifestations are rare (4 – 8 %) but may include myocarditis and transient AV blocks (most common) of varying degree
- Onset 5 weeks
- Presents as syncope, lightheadedness or palpitations
- Block prog



Lyme Disease: Stage 3 (Late Manifestations)

- Untreated (about half) or inadequately treated patients may progress to disseminated disease weeks to months after infection
- The most common manifestation is intermittent swelling and pain of one or a few joints, usually large, weight-bearing joints
- Some patients develop chronic axonal polyneuropathy, or encephalopathy, the latter usually manifested by cognitive disorders, fatigue, and personality changes

Lyme Disease: Stage 3 (Late Manifestations)

- Infrequently, may be severe, chronic, and disabling
- An ill-defined post-Lyme disease syndrome occurs in some persons following treatment
- Taps are nondiagnostic
- Debilitating fatigue, memory loss, central and peripheral neuropathies
- Acrodermatitis chronica atrophicans from bacteria



Lyme Disease

- Diagnosis is based primarily on clinical findings, and it is appropriate to treat patients with early disease solely on the basis of objective signs and a known exposure
- Serologic testing may, however, provide valuable supportive diagnostic information in patients with endemic exposure and objective clinical findings that suggest later stage disseminated Lyme disease
- Antibodies often persist for months or years following successfully treated or untreated infection. Thus, seroreactivity alone cannot be used as a marker of active disease

Lyme Disease

- Prompt treatment shortens course, decreases risk of permanent deficits
- Doxycycline 100 BID x 3 w
- Pregnant, lactating or pediatric patients should get amoxicillin
- Erythromycin for PCN allergic patients
- With mild neurological symptoms, 4 w
- Serious cases, IV/IM rocephins x 2 w
- Advanced disease may not respond

Aquarium Dwellers

- Lionfish are a salt water fish of the Scorpaenidae family of vertebrate fish, divided into 3 genera depending on the venom organ structure
 - *Pterosis* (lionfish) have long slender spines with a venom gland
 - Stonefish (*Synanceja*) have short thick spines and are very well camouflaged (patients may not know what stung them)
 - Scorpaenidae are bottom dwellers in the South Pacific and have heavier spines
- Popular as a salt water aquarium fish as they have a distinctive appearance
- Envenomation occurs via the dorsal, anal, or pelvic spines



Aquarium Dwellers

- Pain at the wound site +/- swelling
- Rarely, nausea, diaphoresis, dyspnea, hypotension, and syncope
- Venom is heat labile, so soaking the affected area in hot water helps



What Can We Do?

- A recent review (1999-2007) by Forrester of US mortality data from deaths caused by non-venomous and venomous animals examined the rates for animal-related fatalities using the estimated 2003 US population
- Inclusion criteria included all mortalities that were a consequence of bite, contact, attack, or envenomation



What Can We Do?

- 1802 animal-related fatalities, with majority from nonvenomous animals (60.4%)
 - 36.4% of animal-related fatalities was attributable to "other mammals," (farm animals)
 - Hymenoptera (hornets, wasps, and bees) deaths have increased and now account for >79 fatalities per year and 28.2% of the total animal-related fatalities from 1999 to 2007
 - Dog-related fatalities have increased, accounting for 28 fatalities per year and 13.9% of the total animal-related fatalities



What Can We Do?

- The authors conclude that prevention measures aimed at minimizing injury from animals should be directed at certain high-risk groups such as farm workers, agricultural workers, and parents of children with dogs
- Forrester J et al Wilderness Environ Med. 2012 Jun;23(2):146-52.



Questions?

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