

## INFESTATIONS, BITES, AND STINGS

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## OBJECTIVES

List diagnosis options for Cutaneous Larva Migrans

List three immediate treatment choices for brown recluse spider bite

Identify three signs of Rocky Mountain Spotted fever

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## CUTANEOUS LARVA MIGRANS

- "Creeping eruption"
- Caused by *Anclostoma braziliensis*, a hookworm of wild and domestic dogs and cats
- Parasitic infestation of the epidermis



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## CLINICAL PRESENTATION

- Serpiginous distribution, usually around the ankles and feet
- Pruritic, threadlike erythematous tracks
- Present days to weeks after exposure to contaminated soil
- Inflammatory response secondary to release of larval secretions



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## PATHOPHYSIOLOGY

- Larva do not penetrate deeper than the basal cell layer of the epidermis
- Larva migrate 1-2 cm/day
- Most frequent in warmer climates
- Adult nematodes live in the intestines of dogs and cats, depositing ova, which are carried to the soil in feces
- Acquired by walking bare-foot in contaminated sand or soil
- Penetrate the skin in humans where the skin touches the soil.
- Systemic involvement is rare



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## DIAGNOSIS

- Clinical presentation
- Biopsy not recommended, as speriginous tract lags behind the movement of the hookworm, causing negative or nonspecific histology
- Detailed history
  - Travel history
  - Skin exposure to the ground or sand in warm climates



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## DIFFERENTIAL

- Scabies
- Larva currens
- Swimmer's itch
- Portuguese man-of-war and jellyfish stings
- Erythema annulare centrifugum
- Tinea pedis

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## Management

- Surgical extraction should be avoided secondary to delayed reaction to the parasite by the skin
- Infection is self-limited, eventually resolved in 4-6 weeks
  - Due to intense pruritus and risk of secondary infection, treatment is recommended
  - Oral:
    - Antihistamines
    - Albendazole 400 mg po x 3-7 days; not during pregnancy
    - Ivermectin 200ug po x 1-2 days; not during pregnancy or breast feeding

**May need second course as failure is common**
  - Topical:
    - Mid- to high potency TCIs
    - Treatment of choice: Thiabendazole (Mintezol) 2-3x/day x 5 days
- Treat secondary infections with antibiotics

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## PATIENT EDUCATION

Wear shoes in areas where parasites are endemic.  
Do not sit, lie, or walk barefoot on wet sand or soil, cover the ground with impenetrable material when sitting or lying on the ground.



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## Syphilis

- Primary syphilis is spirochete *Treponema pallidum* characterized by a cutaneous ulcer (chancre)
- Usually only one lesion
- Lesions are painless

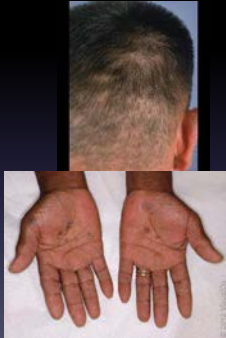


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### Syphilis Sub-types

- Secondary
  - 2-6 weeks after chancre presents
  - Lasts 2-10 weeks
  - Flu-like symptoms, generalized adenopathy, mucocutaneous lesions present
  - "Moth-eaten" alopecia present in scalp, beard, and eye area; may progress to total alopecia
  - Symmetric, bilateral macules; may become necrotic
  - Lesions on trunk, proximal extremities, palms, and soles; may appear on mucous membranes
  - All cutaneous lesions are contagious



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### Syphilis Sub-Types

- Latent
  - 1-4 years after resolution of secondary syphilis
  - 90% relapse within first year; no relapses after 4 years
  - Positive serologic test without presence of active disease
  - Patient history important
  - Patient contagious during this phase

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### Syphilis Sub-types

- Tertiary
  - Untreated or inadequately treated patients
  - Systemic disease
    - Cardiovascular disease
    - CNS lesions
    - Systemic granuloma

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### Syphilis Sub-Types

- Congenital Syphilis
  - Can be transmitted by an infected mother in utero by transplacental transmission of spirochetes
  - Adequate treatment of mother before week 16 usually prevents infection of fetus
  - After 18 weeks gestation treatment may cure disease
    - Risk of irreversible neural deafness, keratitis, and bone changes remain

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### Syphilis Diagnosis

- ICD 10: A51.39 Other secondary syphilis of skin
- Histology
  - VDRL, RPR (rapid plasma reagin) measure specific antibodies
- Microscopically
  - DFA-TP (direct fluorescence antibody test) reveals fluorescent antibody *T. pallidum* in 1-2 days
- Chest X-ray
  - Patients with tertiary syphilis to check for aortic dilation
- Lumbar puncture
  - Patients with neurosyphilis or HIV

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### Syphilis Differential

- Condyloma
- Pityriasis rosea
- Guttate psoriasis
- Lichen planus
- Tinea Versicolor
- Drug and viral exanthems
- Chancroid
- Herpes
- Bechet's syndrome

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## Syphilis Management

- Penicillin 2.4 million units IM---adults
  - Doxycycline 100 mg PO bid x 14 days
  - Tetracycline 500 mg PO bid x 14 days
  - Refer to CDC guidelines
- Pregnancy
  - Dictated by penicillin schedule appropriate for given stage of syphilis
  - No recommended alternative to PCN exists. If PCN allergy, desensitize and treat with PCN
- HIV
  - Primary or secondary treat as those without HIV infection

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## Syphilis Pearls

- “Great mimicker”
- Involvement of palms and soles (secondary lues) should raise suspicion
- Secondary syphilis almost always associated with lymphadenopathy
- Consider diagnosis in patient is mild constitutional symptoms and widespread eruption without scale
- Secondary syphilis more commonly scaly

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## INSECT BITES AND STINGS

- Dog and cat bites
- Human bites
- Spider bites
- Tick bites

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## DOG AND CAT BITES

- Localized infections and cellulitis may be caused by *S. aureus*, *S. intermedius*, and streptococci.
- 25% of dog bites and 50% of cat bites contain *Pasteurella multocida*
- Systemic infections are rare, and result in brain or lung abscess, endocarditis, and sepsis.
- Symptoms are worse in immunocompromised patients.

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## MANAGEMENT

- Culture infected wounds before irrigation or debridement.
- Irrigate tear wounds with normal saline.
- Debride wound edges to control infection.
- Approximate wound edges with adhesive strips and delayed closure. Topical antibiotics are appropriate for minor wounds.
- Bites affecting the hand, face, joints, or penetrating bone or tendon should be treated orally.
- Update Tetanus vaccine.
- Assess for rabies in offending animal or refer to appropriate health department.

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## PHARMACOTHERAPIES

- Mupirocin ointment applied bid, and covered, until wound heals.
- Amoxicillin/beta-lactamase inhibitor (Augmentin) is first line of treatment.
- Doxycycline Or Minocycline for those allergic to penicillin
- Cefuroxime is active against *P. multocida*
- Ciprofloxacin is active against potential pathogens but has not been studied

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## HUMAN BITES

- Aerobic and anaerobic bacteria infect human bite wounds, usually *S. aureus*, and *Haemophilus Eikenella corrodens*
- Human bites have a higher incidence of infections.

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## MANAGEMENT

- Culture before irrigation and debridement.
- Irrigate tear wounds with normal saline and debride wound edges to prevent infection.
- Monitor for infection or empirically treat with oral antibiotics.
- Patient should be reevaluated every 3-4 days until healed.
- Augmentin is first line of treatment
  - Penicillin
  - Cephalosporin
  - Tetracycline

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## SPIDER BITES

- Carnivorous arthropods with fangs and venom used to capture and kill prey
- Most fangs are too small to penetrate human skin
- Brown recluse and black widow spiders are the only spiders in the US whose bites produce severe reactions
- Spiders only bite in self-defense
- Most spider bites are felt as soon as they occur, producing itching, swelling, and erythema

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## MANAGEMENT

- Most spider bites resolve spontaneously.
- Cool compresses will give relief from swelling
- Antihistamines may control itching.

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## BROWN RECLUSE SPIDER BITE

- The brown recluse spider (fiddle-back spider) is 1.5 cm, yellow-tan to brown with a dark, violin or fiddle shaped marking on the back.
- Lives in dark areas such as under wood piles and rocks, under porches, and basements.
- Bites only when forced into contact with the skin, such as collecting wood from the wood pile or putting on clothing where the spider resides.
- Usually found in the southern United States but has been found further north.



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## CLINICAL PRESENTATION

- The bite produces an instantaneous sharp pain resembling a bee sting.
- Most bites are mild, causing minimal swelling and erythema.
- Bites on the fatty areas such as buttocks and proximal thigh show more cutaneous reactions
- Severe bites can cause necrosis within hours.
- A blue-gray macule expands and sinks below the skin surface (sinking infarct), becomes necrotic leaving a deep ulcer that can take weeks to months to heal, resulting in significant scarring.
- Systemic reactions are rare and occur most often in children.
- Characterized by fever, nausea, vomiting, joint and muscle pains, hives or a morbilliform rash, which occurs 12-12 hours after the bite.
- Severe reactions can result in hemolysis, DIC (disseminated intravascular coagulation), renal failure, and rarely death.

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## DIAGNOSTICS

- Clinical diagnosis made by geography, history, skin manifestations, and clinical course
- Most brown recluse spiders found in Midwestern and Southern states



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## DIFFERENTIAL

- Abscess or furunculosis
- Cellulitis
- Caterpillar or centipede envenomation
- Ecthyma
- Factitial ulcer
- Bee or wasp sting
- Lyme disease
- Toxic epidermal necrolysis
- Other spider bites
- Vasculitis
- Syphilitic chancre
- Sweet syndrome
- Necrotizing fasciitis
- Pyoderma gangrenosum
- Diabetic ulcer

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## MANAGEMENT

- Wound irrigation
- Immediate ice and elevation of the area.
- Avoid heat.
- Exercise is to be avoided.
- Analgesics
- Oral antibiotics: Erythromycin or Cephalosporins.
- Anti-inflammatories
- Tetanus if necessary.
- Dapsone 50-100 mg/day may prevent extensive necrosis
- If necrosis is greater than 2 cm, oral Prednisone 1mg/kg x 14-21 days
- Monitor for hemolytic anemia
- Surgery is indicated only for debridement of the necrotic lesions
- Antivenom is not available in the United States or Canada at this time

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## PATIENT EDUCATION AND MONITORING

- Teach patients the importance of ice and elevation which will reduce inflammation
- Monitor necrosis size and treat appropriately
- If systemic involvement is suspected, check for evidence of hemolysis
  - Serial hemoglobin
  - Plasma-free haptoglobin levels
  - Monitor for rhabdomyolysis, renal failure, and DIC

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## BLACK WIDOW SPIDER BITE

- The black widow spider is named because the female consumes her mate after copulation.
- Found in every state except Alaska, and is especially prominent in the southern states.
- The female is black, smooth with an abdomen that resembles a shoe button. A red hourglass marking is present on the underside of the abdomen.
- Adult females are 4 cm, and are the only spiders capable of envenomation.
- The venom contains a neurotoxin which releases acetylcholine from the neuromuscular junction of nerves.
- Black widows are found in webs close to the ground, in dark sheltered areas, woodpiles, and privies.
- They are clumsy and need their web for support, and usually do not bite when away from the web.



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## CLINICAL PRESENTATION

- The bite may be painless, or may produce an immediate sharp pain.
- Slight swelling and the appearance of small red fang marks are present.
- Vascular dissemination of the neurotoxin is known as *latrodectism*.
- Severe abdominal pain and spasm are the prominent features of *latrodectism*.
- The abdomen becomes board-like and rigid without distension
- Generalized abdominal pain, back and leg pain are the most common complaints.
- Within 15 minutes to 2 hours, a dull muscle ache or severe pain with numbness spreads from the bite to involve the torso and legs.
- There is an increase in deep tendon reflexes.
- Symptoms increase for 24 hours and gradually decrease in 2-3 days.
- Weakness and transient muscle spasm may persist for weeks to months.
- Recovery from one serious attack affords systemic immunity to subsequent bites.
- Convulsions, shock, paralysis, and death are rare, and usually occur in young children or elderly.

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## DIAGNOSTICS

- Look for tiny fang marks and diaphoresis at the bite site
- There may be a halo lesion consisting of a pale circular area surrounded by a ring of redness



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## DIFFERENTIAL

- See Brown Recluse Spider Bite
- Abdominal aneurysm
- Acute appendicitis
- Mesenteric ischemia
- Ectopic pregnancy
- Pancreatitis
- Anxiety
- Hypertension
- Hypocalcemia
- Muscle spasms
- Priapism



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## MANAGEMENT

- ABCs (Airway, Breathing, Circulation)
- Collect spider if possible
- Routine cleansing of bite site
- Apply ice to restrict the spread of venom and provide analgesia
- Spider-specific antivenom (Merk & Co. Inc.) IM or IV if patient is <12 years or in shock. Antivenin may be given IM for 1-2 days. Symptoms subside in 30 minutes to 3 hours
- Hospitalization for patients under 16 years or older than 65, pregnant, have hypertensive heart disease, respiratory distress, or symptoms of severe latrodectism.
- Muscle relaxants: Calcium gluconate (10%, 10 ml IV) acts as a muscle relaxant. IV or oral Valium, IV or oral methocarbamol.
- IV Morphine if pain is severe, however should be used with caution as venom may cause respiratory paralysis.
- Tetanus prophylaxis

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## EDUCATION AND MONITORING

- Application of ice is important to restrict spread of venom
- Closely monitor for convulsions and respiratory failure

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## Tick Bites

- Arachnids; live in wooded, grassy areas
- Attach to human host when person brushes past, move to warm moist location, burrow and feed off host blood
- Do not jump or fall on people

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## Tick Bite

- Clinical Presentation
  - Small red area, may or may not be raised
  - Similar to mosquito bite
  - May develop larger red ring (bull's-eye) within days, weeks, or months

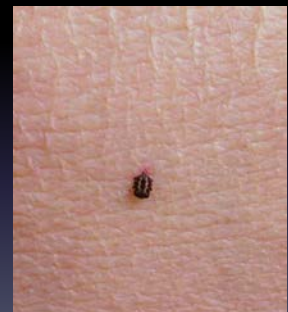



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## Tick Bite

- Differential Diagnosis
  - Spider bite
  - Mosquito bite
  - Flea bite
  - Foreign body
  - Fixed drug eruption



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## Tick Bite

|   |   |
|---|---|
| <b>Diagnosis</b>  | <b>Pearls</b>   |
| <ul style="list-style-type: none"><li>• Based on presence of tick or history</li><li>• ICD10: W57.XXXA: bitten or stung by nonvenomous insect, other arthropod, initial encounter</li></ul> | <ul style="list-style-type: none"><li>• Inspect all skin areas, including scalp and groin</li><li>• Evaluate all black or brown spots on the skin</li></ul> |

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## Tick Bite

|  |  |
|--|--|
| <b>Management</b>  | <b>Lyme Disease Prophylaxis</b>  |
| <ul style="list-style-type: none"><li>• Completely remove tick<ul style="list-style-type: none"><li>– Remove promptly with fine-tipped forceps</li></ul></li><li>• Prevention<ul style="list-style-type: none"><li>– Protective clothing</li><li>– Repellants (DEET)</li><li>– Inspection following outdoor activities</li></ul></li></ul> | <ul style="list-style-type: none"><li>• ALL of criteria must be met:<ul style="list-style-type: none"><li>– Attached tick identified as <i>Ixodes scapularis</i></li><li>– Attached 36 hours</li><li>– Postexposure prophylaxis started within 72 hours of tick removal</li><li>– Local rate of infection with <i>Borrelia burgdorferi</i> is 20%</li><li>– Doxycycline not contraindicated</li></ul></li></ul> <p>Observation recommended in criteria not met</p> |

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## Lyme Disease

- Disseminated disease begins within weeks as spirochete circulates to nervous system, heart, joints
- Patient may develop multiple skin lesions, neurologic abnormalities, AV block, or myocarditis
- Untreated patients may progress to late stage disease:
  - Arthritis
  - Mild encephalopathy
  - Neuropathies

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## Lyme Disease

- Immune-mediated inflammatory disease
- Infection with bacterial spirochete *Borrelia burgdorferi*
- Begins with slowly expanding skin lesion at site of tick bite
  - Erythema migrans (EM)

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## Lyme Disease


- 3 Clinical Phases:
  - Early localized disease
  - Early disseminated disease
  - Late disease

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### Lyme Disease

- Epidemiology
  - New England, Midwest states, and west coast
  - Blacklegged tick or deer tick
  - Mice and deer major animal reservoirs
  - Mainly spring and summer months
  - Increases risk of infection linked to amount of time spent in wooded areas



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### Lyme Disease

- Systemic Symptoms:
  - Flu like symptoms
  - Fatigue
  - Headache
  - Neck stiffness
  - Myalgias/Arthralgias
  - Lymphadenopathy
  - Fever
- Early Localized (days to weeks)
  - EM at site of tick bite (60-90% of patients)
  - May/may not be systemic symptoms
  - False negative serologic testing common

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### Lyme disease

- Early disseminated (weeks to months)
  - Multiple widespread skin lesions
  - Up to 15% of pts developo neurologic symptome: meningitis, cranial/peripheral neuropathy, Bell palsy
- 5% may experience cardiac sx: AV block or myocarditis
- Serologic testing usually positive

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### Lyme Disease

- Late (months-years)
  - Chronic arthritis
  - Mild encephalopathy, subtle cognitive deficits
  - Axonal polyneuropathies
  - Serologic testing positive

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### Lyme disease

- Chronic Lyme Disease/Post-Lyme Disease Syndrome
  - Small percentage of treated patients report ongoing nonspecific symptoms
  - Persistent infection not demonstrated

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### Lyme Disease

- Diagnosis:
  - Transmission takes 24-48 hours; brief tick exposure not sufficient
  - Clinical suspicion in endemic areas
  - Trunk, axillae, groin, popliteal fossa
  - Target lesions
  - ICD 10:A69.20: Lyme disease unspecified



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## Lyme Disease

- Consider diagnosis for patients presenting with flu-like symptoms and no cough in summer
- Diagnostics:
  - Serologic testing 4-6 weeks after tick bite to avoid false negative/positive results
  - Do not delay treatment for lab results

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## Lyme Disease

- In the U.S. Lyme disease is reportable except in HI and PR



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## Lyme Disease Treatment

- Early Localized:
  - Doxycycline 100 mg q 12 h x 14-21 days
  - Amoxicillin 500 mg q 8 h x 14-21 days if pregnant
  - Alternative
    - Cefuroxime axetil 500 mg q 12 h/14-21 days
    - Azithromycin 500 mg q 24 h/7-10 days
    - Clarithromycin 500 mg q 12 h/14-21 days
    - Erythromycin 500 mg q 6 h/14-21 days

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## Lyme Disease Referral

- If early disease and effective treatment, no referral
- Persistent symptoms:
  - Rheumatology, neurology, cardiology
  - Advanced disease/ treatment failure
    - Infectious disease

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## Lyme Disease Treatment

- Mild Early Disseminated
- Doxycycline 100 mg q 12 h x 14-21 days
- Amoxicillin 500 mg q 8 h/ 14-21 days
- Alternative
  - Cefuroxime axetil 500 mg q 12 h/14-28 days

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## Lyme Disease Treatment

- Severe Early Disseminated
  - Ceftriaxone 2 g IV q 24/14-28 days
  - Alternative
    - Cefotaxime 2 g IV q 8/14-28 days
    - Penicillin G 18-24 million units IV daily, divided q 4 h/14-28 days

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## Rocky Mountain Spotted Fever

- RMSF caused by gram-negative bacterium *Rickettsia rickettsia*
- Most severe rickettsial illness in humans
- 20-30% fatality without treatment
- Most common from Arkansas, Missouri, North Carolina, Oklahoma and Tennessee.
- More frequent in males and children.
- April through September

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## RMSF Clinical Presentation

- Late:
  - Rash (children, young adults)
  - Photophobia
  - Confusion
  - Ataxia
  - Seizures
  - Cough
  - Dyspnea,
  - Jaundice
  - Severe abdominal pain
- Early:
  - High fever
  - Severe headache
  - Myalgias
  - Nausea, Vomiting

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## RMSF Diagnosis

- ICD10: A77.0 Spotted fever due to *Rickettsia rickettsii*
- S&S 3-12 days after infection
  - Fever, headache, myalgias almost always present
  - Nausea, vomiting, abdominal pain variably present
  - Rash (90%) 2-5 days after onset of fever
  - Macules: ankles, wrists, forearms, spread centripetally to trunk. Face spared. Palms and soles most common.
  - Lesions progress to papules and petechiae



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## RMSF Differential

- Meningococemia
- Measles
- Enteroviral infections
- Dengue fever
- Vasculitis
- Drug Eruptions
- Secondary Syphilis



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## RMSF

- Tests:
  - Indirect immunofluorescence assay (IFA)
  - ELISA
  - Skin biopsy with direct immunofluorescence
- Serology:
  - Skin biopsy with direct immunofluorescence
- Pearls
  - Treatment should be initiated immediately with high clinical suspicion
  - Early treatment most effective to prevent death
  - Remove tick within 6 hours may prevent transmission
  - RMSF reportable in DC, and all states except Hawaii, Maine, Washington

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## RMSF Treatment

- Doxycycline
- Chloramphenicol (caution in 3<sup>rd</sup> trimester)
- Treat 3 days after fever subsides, usually 7-14 days



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## Jellyfish

- Free-swimming non-aggressive gelatinous marine animals surrounded by tentacles
- Tentacles covered with nematocysts filled with venom
- Found near the water surface at dusk



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## Jellyfish Symptoms

- Intense stinging, pain, rash
- Progressive symptoms: nausea, vomiting, diarrhea, adenopathy, muscle spasms
- Severe reactions cause difficulty breathing, coma, death

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## Jellyfish Sting Treatment

- Benadryl and acetaminophen or ibuprofen
- Soak area in acetic acid (vinegar), sea water, or 70% isopropyl alcohol 15-30 minutes (fresh water will cause nematocysts to continue to release toxins)
- Remove tentacles with tweezers
- Apply shaving cream or paste of baking powder, shave area with razor or credit card

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## Initial Reaction



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## 10 Days Post-Injury



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## 2 Weeks Post-Injury



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## 6 Weeks Post-Injury



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## Seabather's Eruption

- Pruritic dermatitis
- Hypersensitivity reaction to nematocysts of larval-stage thimble jellyfish
- Sometimes called "sea lice"



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## Seabather's Eruption

- Small red papules on areas covered by water-permeable clothing during ocean swimming
- Upon leaving the ocean, organisms stuck against skin die, discharge nematocysts



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## Treatment

- Scratching causes intense itching and swelling
- Prompt removal of swim clothing while wet
- Warm sea-water shower
- Diphenhydramine, topical corticosteroids



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- Centers for Disease Control and Prevention, [www.cdc.gov](http://www.cdc.gov)
- DermNetNZ, [www.dermnetnz.org](http://www.dermnetnz.org)
- Mayo Clinic: diseases and conditions, [www.mayoclinic.com/health/DiseasesIndex](http://www.mayoclinic.com/health/DiseasesIndex)
- Medscape: dermatology; <http://emedicine.medscape.com>
- National Eczema Association, [www.nationaleczema.org](http://www.nationaleczema.org)
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