Fever and Rash: Infectious Diseases of Leisure: Urgencies, Emergencies and Nuisances

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Associate Hospital Epidemiologist

VCU Medical Center
Virginia Commonwealth University
When Mars Meets Venus....
Case 1

- 21 year old man complained of 3 days of flu-like illness with low grade fever, arthralgias and myalgias
- Over the following 24 hours he noted tender pustular lesions on his hands, feet, arms, legs and lower back.
- He denied headache, photophobia, meningismus, genital lesions and penile discharge
Case 1

- Physical examination:
  - Vitals: T 38.8°C, P 100, RR 14, BP 130/72
  - General: appears uncomfortable
  - HEENT/Chest/Abdomen: all WNL
  - Genitals: normal, no lesions, no penile discharge
Pustular, tender, erythematous lesions
Pustular, tender, erythematous lesions
Pustular, tender, erythematous lesions
Swollen and tender PIP joint, 3rd digit of right hand
Extremities: swollen, tender, erythematous left knee
Gonococcemia
Richmond, Virginia: Gonorrhea Rate Tops US Chart

*Times-Dispatch (Richmond, Va.)*

03.06.02; Tammie Smith

Richmond, Va., had the highest gonorrhea rate in 2000 among US cities, even though the actual number of cases declined from 1999. In 1999, Richmond had the nation's second-highest gonorrhea rate, just below Baltimore's. Baltimore dropped to third place in the 2000 calculations.

Richmond's gonorrhea rate was 923.6 cases per 100,000 residents in 2000; this is about seven times the national average of 131.6 cases per 100,000 people. In raw numbers, Richmond recorded 1,752 cases of gonorrhea in 2000, down from 1,827 the year before; however, greater declines in other high-ranking cities put Richmond in the top spot.
Gonococcemia

Overt clinical signs of genital infection are frequently absent in disseminated gonococcemia.

*N. gonorrhea* is cultured from a mucosal site in 80% of the cases.
The multiple potential paths of Gonococcal invasion

- Fallopian tube
- Uterus
- Ovary
- Cervix
- Endometritis
- Salpingitis
- Peritonitis
- Dura mater
- Arachnoid
- Pia mater
- Brain
- Meningitis
- Endocarditis
- Arthritis
- Dermatitis

PID
UG
DGI

(Needs further explanation of terms and processes)
## Gonococcemia

<table>
<thead>
<tr>
<th>Mode of Transmission</th>
<th>Clinical Manifestations</th>
<th>Dermatologic Manifestations</th>
</tr>
</thead>
</table>
| Person to person via sexual contact | • Fever  
• Chills  
• Joint pain: single or multiple joints (knee pain, wrist pain, ankle pain)  
• Joint swelling (knees, wrists, ankles) | • Skin rash: begins as flat, pink-to-red macules, evolve into pustular papules and nodules  
• Painful tendons of wrists, digits, heels |
Gonococccemia

<table>
<thead>
<tr>
<th>Diagnostic Pearls</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ask about sexual activity!</td>
<td>Treatment is usually with intravenous antibiotics:</td>
</tr>
<tr>
<td>• Intercourse and oral sex</td>
<td>• Ceftriaxone</td>
</tr>
<tr>
<td>• Blood culture</td>
<td>• Levofloxacin</td>
</tr>
<tr>
<td>• Skin lesion culture</td>
<td>Concurrent treatment for chlamydia should be given</td>
</tr>
<tr>
<td>• Culture of synovial fluid from joints</td>
<td>• Doxycycline</td>
</tr>
<tr>
<td>• Urethral discharge culture</td>
<td>• Azithromycin</td>
</tr>
<tr>
<td>• Culture from endocervix</td>
<td></td>
</tr>
<tr>
<td>• Throat culture</td>
<td></td>
</tr>
<tr>
<td>• Anal culture</td>
<td></td>
</tr>
<tr>
<td>• Cultures should be performed on chocolate agar</td>
<td></td>
</tr>
</tbody>
</table>
Crowded Environments
Case 2

• A 24 year old inmate from the Richmond City Jail with fever, headache and myalgias 24 hours prior to admission.
• Over the last 12 hours nuchal rigidity developed.
• He was found unconscious in his cell and immediately transferred to VCU.
Case 2

T: 39.9°C, P=1118, BP=130/80, RR-20
Appears ill, uncooperative
Nuchal rigidity noted
Cardiac and respiratory exams normal
Abdomen soft and non-tender
Cutaneous exam: petechial rash - non blanching, with diffuse purpura on lower extremities
Case 2

WBC 17,000, 90%N  
BUN/Creatinine- WNL  
LFT: AST 55/ALT 45  
CXR: clear  
LP: increased pressure: cloudy; increased protein, decreased glucose
Meningococcal Disease

Inmate dies of meningitis

No other cases reported among other inmates, city jail staff

BY JIM MASON
TIMES DISPATCH STAFF WRITER

A Richmond City Jail inmate diagnosed with bacterial meningitis died yesterday morning in Medical College of Virginia Hospitals.

The Richmond Sheriff’s Office identified the inmate as Stephen Stevenson but provided no other details about him. A hospital spokesperson confirmed the death.

Sheriff Michelle B. Mitchell couldn’t be reached last night, but a news release from her office yesterday afternoon said there had been no other reported cases among inmates or jail staff.

Doctors at MCV’s Infectious Disease Clinic made the diagnosis and recommended treatment with an antibiotic for anyone who had had contact with the inmate, the release said.

The jail’s night watch commander, asked last night whether any jail inmates or staff had been treated, said he wasn’t authorized to give any information.

According to the news release, Stevenson entered the jail July 23.

On Friday, he became ill with flu-like symptoms and was treated at the jail for pain and a fever.

A physician at the jail treated him Saturday morning for a viral infection and dehydration, the news release said.

Saturday evening, Stevenson’s condition deteriorated, and he was taken to MCV.

Meningitis is an infection of the fluid of a person’s spinal cord and fluid surrounding the brain. Viral meningitis is generally less severe, while bacterial meningitis may result in brain damage and is potentially fatal.

Infection is marked by high fever, headache and a stiff neck, symptoms that can develop within hours or a few days. Other symptoms may include nausea, vomiting and sleepiness.

Medical authorities say early diagnosis and treatment with antibiotics are critical.

Contact Jim Mason at (804) 649-6451 or jmason@timesdispatch.com

Mondays, September 10, 2001

Meningitis hits VUU student

Bacterial version strikes freshman

BY SHAWN COX
TIMES DISPATCH STAFF WRITER

An 18-year-old freshman at Virginia Union University was in critical condition last night after contracting bacterial meningitis, a rare but contagious, and potentially fatal, infection.

The New York City native, whose identity is being withheld at the request of his family, was admitted to Virginia Commonwealth University’s Medical College of Virginia Hospitals about 3 a.m., yesterday after experiencing vomiting and other flu-like symptoms.

“The doctor said, if he had a crystal ball and could look in it and tell us that everything was going to be all right, he certainly would want to be able to do that,” VUU President Bernard W. Franklin said last night. “But at this point, the best that we can do is wait and pray.

“This has been a very sobering experience for our students, even though during our freshman orientation program we did emphasize the importance of getting a vaccination for meningitis. After the sobering effect, I...
## Meningococcal Disease: Recent Cases at MCVH

<table>
<thead>
<tr>
<th>Case #1</th>
<th>Case #2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Admit date</strong></td>
<td>August 11, 2001</td>
</tr>
<tr>
<td><strong>Age/gender</strong></td>
<td>24 year old male inmate</td>
</tr>
<tr>
<td><strong>Residence</strong></td>
<td>Richmond City Jail</td>
</tr>
<tr>
<td><strong>Presentation</strong></td>
<td>1 day h/o headache, fever, myalgias; found unconscious</td>
</tr>
<tr>
<td><strong>PMH</strong></td>
<td>GSW abdomen 1997→ asplenic</td>
</tr>
<tr>
<td><strong>Outcome</strong></td>
<td>Died on hospital day #3</td>
</tr>
</tbody>
</table>
Microbiology

- Gram-negative, diplococci
- Usually found extracellularly & in PMNs
- Usually encapsulated & piliated
- Aerobic
- 13 serogroups based on capsular polysaccharide
- Humans are the only natural reservoir
Epidemiology of Meningococcal Disease

- 2,400-3,000 cases/year in the US
- 500,000 cases/year in the world
- 2\textsuperscript{nd} most common cause of meningitis in the US (10-35\% of cases)
- >90\% of cases occur in pts <45 years old
- Numerous outbreaks on college campuses
- Meningitis belt: intense serogroup A epidemics in broad savannah region in Africa from Gambia to Ethiopia
Risk Factors for Meningococcal Disease in College Students
Matched (3:1) case control study; 96 cases; multivariate analysis

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>OR (95% CI)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman in dormitory</td>
<td>3.6 (1.6-8.5)</td>
<td>.003</td>
</tr>
<tr>
<td>White race</td>
<td>6.6 (1.2-38.0)</td>
<td>.03</td>
</tr>
<tr>
<td>Radiator heat</td>
<td>4.0 (1.4-11.0)</td>
<td>.008</td>
</tr>
<tr>
<td>URI in last month</td>
<td>2.3 (1.0-5.3)</td>
<td>.04</td>
</tr>
</tbody>
</table>

Bruce MG et al. JAMA 2001;286:688-693.
# Meningococcal Disease, US Army, World Wars

<table>
<thead>
<tr>
<th></th>
<th>Number of cases</th>
<th>Number of deaths</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>World War I</td>
<td>5,839</td>
<td>1,836</td>
<td>31.4%</td>
</tr>
<tr>
<td>World War II</td>
<td>13,922</td>
<td>559</td>
<td>4.0%</td>
</tr>
</tbody>
</table>

Host Response to Respiratory Infection with *N. meningitidis*

- Complete eradication of the organism
- Nasopharyngeal carrier state without systemic invasion
- Nasopharyngeal carrier state leads to systemic disease
Transmission

- Person to person by respiratory droplets or direct contact with secretions
  - Since respiratory droplet susceptible to drying, close contact (<3 feet) is necessary for transmission
- Most patients do not recall contact with a case
  - Thus asymptomatic carriers are the source of transmission
- 300-1000 fold increased risk for invasive disease in household contacts of an index case (attack rate 0.3-1%)
- 1/1000-1/5000 colonized persons develops invasive disease
Colonization

- Site of colonization is the nasopharynx
- 5-10% of adults are asymptomatic carriers
- Median duration of carriage = 9-10 months
- Carriage is an immunizing process
  - Carriage increases under conditions of crowding (e.g., military recruits, pilgrims, colleges, jails)

Pathology

- Primary lesion: diffuse vascular damage & intravascular coagulation
- Blood vessels blocked by fibrin thrombi with trapping of WBCs & bacteria → tissue ischemia
- Sites: skin, serosal & mucosal surfaces, mediastinum, epicardium, endocardium, lungs, liver, kidneys, adrenals, intestines, spleen
# Clinical Syndromes

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteremia without sepsis (transient benign</td>
<td>Child presents with upper respiratory illness; blood cultures grow NM but repeat cultures negative; uncomplicated recovery without antibiotics</td>
</tr>
<tr>
<td>bacteremia)</td>
<td></td>
</tr>
<tr>
<td>Meningococcemia without meningitis</td>
<td>Sepsis, headache, fever, rash, malaise, hypotension</td>
</tr>
<tr>
<td>Meningitis + meningococcemia</td>
<td>Headache, fever, meningeal signs, cloudy CSF; DTRs, superficial reflexes present; no pathologic reflexes</td>
</tr>
<tr>
<td>Meningoencephalitis</td>
<td>Profoundly obtunded, meningeal signs, septic CSF; DTRs, superficial reflexes altered; pathologic reflexes frequently present</td>
</tr>
</tbody>
</table>

Acute Meningococcemia without Meningitis

- Presents with sudden onset of fever, chills, myalgias, weakness, nausea, vomiting, headache
- Leukocytosis with left shift
- Rash present or develops over next few hours
- Some develop hypotension or shock
- In fulminant cases, death can occur within 12 hours of symptom onset
Acute Meningococcemia: Rash

- Erythematous maculopapular rash
  - Light pink
  - Indistinct borders
  - Transient (half hour to 2 days)
- Purpuric rash
  - Occurs in 40-90%
  - Always accompanied by DIC
  - Petechiae, ecchymoses or gross intracutaneous hemorrhages
  - Purpura usually appear within 12-36 hours of disease onset
  - May lead to purpura fulminans
Meningococcemia Complications

- Purpura fulminans
- Autoimmune-like complications:
  - Synovitis
  - Serositis
- Neurologic sequelae (0-15%)
  - Deafness (4-6%)
  - CN VI, VII palsies (5-10%)
Meningococcemia Complications

- Bilateral adrenal hemorrhage (Waterhouse-Friderichsen Syndrome)
  - Found in 30% of patients with shock secondary to meningococcal disease
  - Found in 70% of cases at autopsy

Laboratory Studies

- CSF: gram stain positive in 75-80%; culture positive in 90%
- CSF latex agglutination: 70-80% sensitive
- Peripheral blood smear: organisms may be seen indicating high-grade bacteremia; suspect asplenic state
- Blood culture: positive in 40-75%
Chronic Meningococccemia

• Chronic meningococccemia is a rare (<200 documented cases) clinical presentation of *N meningitidis* most often observed in adults.

• Clinically, it can be confused with the dermatitis-arthritis syndrome associated with subacute gonococccemia.
  – Recurrent attacks of fever associated with migratory arthralgias, arthritis, and leukocytosis.
  – Recur over a period of 6-8 months.
  – Cutaneous manifestations are variable
    • Include rose-colored macules and papules
    • Indurated nodules, petechiae, purpura, or large hemorrhagic areas.
Chronic Meningococcemia

- Chronic meningococcemia differs histopathologically from acute meningococcemia
  - no bacteria are present in the cutaneous lesions
  - thrombi do not occlude capillaries and venules, and endothelial swelling does not occur.
  - The most common finding in a person with chronic meningococcemia is a leukocytoclastic angiitis.
Management: Antimicrobials

- Should not be delayed for diagnostic procedures
- Drug of choice: ceftriaxone 2 g IV q 12 hr
Prognosis

• “No other infection so quickly slays…”
  Herrick WW. Arch Intern Med 1919;23:409-418.

• Almost all deaths from meningococcal meningitis are due to cerebral edema and brainstem herniation

• Meningitis: 10-15% mortality

• Meningococcemia: up to 40% mortality

• Sequelae (hearing loss, neurologic disability, limb loss) in 11-19%
The Great Outdoors
Case 3

- A 12 year old boy presents to the emergency department with a 2 day history of chills, fever and headache after a camping trip.
- These symptoms were preceded by nausea, vomiting and abdominal pain but no diarrhea.
- There was no dyspnea or chest pain.
Case 3

T = 40°C, P-110 RR20, 120/60
Ill appearing
Conjunctival suffusion with periorbital edema
Cardiac/Chest-unremarkable
Abdomen: generalized tenderness
Labs:
WBC-10,000, Plts-160,000
AST-85; Alp-WNL
Chemistries WNL
CXR- WNL
RMSF- *Rickettsia rickettsii*

- *Rickettsia rickettsii*, an intracellular pathogen
- They are not visualized by routine staining.

Gimenez stain of tick hemolymph cells infected with *R. rickettsii*
RMSF - *Rickettsia rickettsii*
RMSF

Rocky Mountain wood tick 
(\textit{Dermacentor andersoni})

• Rickettsiae are transmitted to a vertebrate host through saliva while a tick is feeding.
• It usually takes \textit{several hours} of attachment and feeding before the rickettsiae are transmitted to the host.
• About 1\%-3\% of the tick population carries \textit{R. rickettsii}, even in highly endemic areas.

The American dog tick 
(\textit{Dermacentor variabilis})
RMSF

- Rocky Mountain spotted fever has been a reportable disease in the United States since the 1920s.
- In the last 50 years, approximately 250-1200 cases of Rocky Mountain spotted fever have been reported annually.
- Over 90% of patients with Rocky Mountain spotted fever are infected during April through September. This period is the season for increased numbers of adult and nymphal Dermacentor ticks.
RMSF

• The rash involves the palms or soles in as many as 50% to 80% of patients

• As many as 10% to 15% of patients may never develop a rash
RMSF

Early (macular) rash on sole of foot

Late (petechial) rash on palm and forearm

Caveat: Approximately 10–15% of patients have Rocky Mountain *spotless* fever. This more often is reported in older patients and African American patients.
# RMSF

## Mode of Transmission

<table>
<thead>
<tr>
<th>Clinical Manifestations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial symptoms:</strong></td>
</tr>
<tr>
<td>• fever</td>
</tr>
<tr>
<td>• nausea</td>
</tr>
<tr>
<td>• vomiting</td>
</tr>
<tr>
<td>• severe headache</td>
</tr>
<tr>
<td>• myalgias</td>
</tr>
<tr>
<td>• anorexia</td>
</tr>
<tr>
<td><strong>Late signs and symptoms</strong></td>
</tr>
<tr>
<td>• abdominal pain</td>
</tr>
<tr>
<td>• arthragias</td>
</tr>
<tr>
<td>• diarrhea</td>
</tr>
<tr>
<td>• 3-5% mortality due to myocarditis</td>
</tr>
</tbody>
</table>
RMSF

- The indirect immunofluorescence assay (IFA) is the reference standard in Rocky Mountain spotted fever serology and is the test currently used by CDC and most state public health laboratories.

- IFA has a sensitivity of 70% and a specificity of 100%.
## RMSF

<table>
<thead>
<tr>
<th>Diagnostic Pearls</th>
<th>Serology:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Fever, rash, and</td>
<td>• Most patients demonstrate increased IgM titers by the end of the first</td>
</tr>
<tr>
<td>history of tick bite.</td>
<td>week of illness.</td>
</tr>
<tr>
<td>• *Treatment decisions</td>
<td>• Diagnostic levels of IgG antibody generally do not appear until 7-10</td>
</tr>
<tr>
<td>should be based on</td>
<td>days after the onset of illness.</td>
</tr>
<tr>
<td>epidemiologic and clinical</td>
<td></td>
</tr>
<tr>
<td>clues, and should never be</td>
<td></td>
</tr>
<tr>
<td>delayed while awaiting</td>
<td></td>
</tr>
<tr>
<td>laboratory confirmation.</td>
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</tbody>
</table>
RMSF

**Diagnostic Pearls**

- Thrombocytopenia with normal WBC and petechial rash is suggestive of RMSF
- The rash of RMSF begins peripherally and then spreads centrally
- Edema of the hands and feet is common
- Abdominal symptoms and CNS symptoms may predominate in the early presentation
- Conjunctival suffusion and periorbital edema are important clues to RMSF
RMSF

<table>
<thead>
<tr>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antibiotic:</strong></td>
</tr>
<tr>
<td>tetracyclines (doxycycline) for 7-14 days.</td>
</tr>
<tr>
<td><strong>Supportive Care:</strong></td>
</tr>
<tr>
<td>IV hydration for hypotension or prerenal azotemia</td>
</tr>
<tr>
<td>Packed red blood cells (pRBCs) for anemia or severe life-threatening GI bleeding</td>
</tr>
<tr>
<td>Platelet transfusion for severe thrombocytopenia with active bleeding</td>
</tr>
<tr>
<td>Hemodialysis for acute tubular necrosis</td>
</tr>
</tbody>
</table>
Case 4

• A 40 year old man has been vacationing with his family in the New England Coast. Two weeks later he complains of progressive fever and myalgias. He denies cough, chest pain, dyspnea, diarrhea, abdominal pain and night sweats.
Case 4

Physical Exam
T:102F, P118, BP170/90, R14
Sick appearing, uncomfortable
HEENT-WNL
Chest: Cardiac: WNL
Abdomen: possible splenomegaly
Ext: no edema or clubbing
Labs:
WBC 4100, 5% atypical lymphocytes
Plts 75,000, ESR-44
Chemistries-WNL, CXR-WNL
Dr. Paul Ehrlich  
(Immunologist)  

Dr. Sigmund Freud  
(Not an immunologist)
**Ehrlichiosis**

Human monocytic ehrlichiosis (HME) is caused by *Ehrlichia chaffeensis*.

- Lone-star tick (*Amblyomma americanum*)
- American dog tick (*Dermacentor variabilis*)
- Deer tick (*Ixodes scapularis*)
- American dog tick (*D variabilis*)

Human granulocytic ehrlichiosis (HGE) is caused by *Ehrlichia phagocytophilia*.
Ehrlichiosis
**Ehrlichiosis**

<table>
<thead>
<tr>
<th>Clinical Manifestations</th>
<th>Dermatologic Manifestations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tick bites or exposure (&gt;90% in 1 series)</td>
<td>Rash (10%): When present in <em>ehrlichiosis</em>, the rash is <strong>maculopapular</strong> and <strong>not</strong> petechial.</td>
</tr>
<tr>
<td>Fevers (&gt;90%)</td>
<td></td>
</tr>
<tr>
<td>Headaches (&gt;85%)</td>
<td></td>
</tr>
<tr>
<td>Malaise (&gt;70%)</td>
<td></td>
</tr>
<tr>
<td>Myalgias (&gt;70%)</td>
<td></td>
</tr>
<tr>
<td>Rigors (60%)</td>
<td></td>
</tr>
<tr>
<td>Nausea (40%)</td>
<td></td>
</tr>
<tr>
<td>Vomiting (40%)</td>
<td></td>
</tr>
<tr>
<td>Anorexia (40%)</td>
<td></td>
</tr>
<tr>
<td>Confusion (20%)</td>
<td></td>
</tr>
</tbody>
</table>
**Ehrlichiosis**
The hematopoietic system -target cells for the pathogens are monocytes or granulocytes

Photomicrograph of a granulocyte containing the *Ehrlichia* morula (arrow) of HGE.
Stain is with *Wright’s-Giemsa*

*E.chafeensis* causing HME
Ehrlichiosis

Laboratory

- HME/ HGE suggested by elevated immunoglobulin G (IgG) immunofluorescent antibody (IFA) *Ehrlichia* titer or by demonstrating a 4-fold or greater increase between acute/convalescent IFA *Ehrlichia* titer
- Cytoplasmic inclusions (morulae) are diagnostic
- CBC should be obtained for possible neutropenia, lymphocytopenia, or thrombocytopenia.
- Serum transaminases are mildly elevated as in other tick-borne transmitted infectious diseases
**Ehrlichiosis**

<table>
<thead>
<tr>
<th>Clinical Course</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The HME mortality rate is 2-5%, while that for HGE is 7-10%.</td>
<td>• Doxycycline is the preferred antibiotic</td>
</tr>
<tr>
<td>• HME hospitalization rate is up to 60%, while GME is 28-54%</td>
<td>• Supportive care may be necessary if symptoms are severe and if there are hemorrhagic complications</td>
</tr>
<tr>
<td>• Death is due to DIC &amp; hemorrhagic complications</td>
<td></td>
</tr>
<tr>
<td><strong>RMSF</strong></td>
<td><strong>Ehrlichiosis</strong></td>
</tr>
<tr>
<td>----------</td>
<td>-----------------</td>
</tr>
<tr>
<td>• Tick borne&lt;br&gt;• Fever, headaches, arthralgias, myalgias are common&lt;br&gt;• Rash <em>common</em>; petechial in nature&lt;br&gt;• Conjunctival suffusion and periorbital edema is an important diagnostic clue.&lt;br&gt;• Serology or skin biopsy with IFA may help confirm diagnosis&lt;br&gt;• Rx: doxycycline</td>
<td>• Tick borne&lt;br&gt;• Fever, headaches, arthralgias, myalgias are common&lt;br&gt;• Rash <em>uncommon</em>: lacy, maculopapular&lt;br&gt;• Conjunctival suffusion and periorbital edema is <em>absent</em>&lt;br&gt;• Wright’s Giemsa stain of blood may be diagnostic (morulae)&lt;br&gt;• Rx: doxycycline</td>
</tr>
</tbody>
</table>
And remember…..

Ticks can carry more than one infectious agent: Co-infections have occurred with *Babesia microtii*, RMSF and/or *Ehrlichia* species.
Dining
Paradise
Case

• “An Anchorage woman reported that she and her husband had become ill about one-half hour after consuming a meal of marinated raw salmon. Illness consisted of generalized hives, a brassy taste, flushing, abdominal cramps, nausea, and vomiting without diarrhea. Symptoms persisted for four hours.”
Case

- “August 12th, a Valdez physician informed our office that three days previous she had treated nine Japanese sailors for an illness which began one hour after eating a meal of mixed raw cod, flounder and salmon.”
- “Illness was said to have affected most of the 23 man crew, but only nine were seen by the doctor. “
- “She found tachycardia in two, hives in four, nausea in eight, and vomiting in two. No respiratory difficulty was noted. Treatment included emetics, antihistamines, and epinephrine.”
- “Symptoms resolved by morning and the crew left for Japan with a cargo of refrigerated raw fish.”
Is this an allergic reaction to fish?
Scombroid

- Scombroid fish poisoning is a food-related illness typically associated with the consumption of fish.
  - Scombroidea fish
    - Large dark meat marine tuna, albacore, mackerel, skipjack, bonito, marlin Mahi-Mahi
Scombroid

Symptoms are related to the ingestion of biogenic amines, especially histamine.

Serum histamine levels and urinary histamine excretion are elevated in humans with acute illness.

The result is a massive histamine like reaction

Cooking does not inactivate the toxin!
# Scombroid

<table>
<thead>
<tr>
<th>Clinical Presentation</th>
<th>Dermatologic Manifestations</th>
</tr>
</thead>
<tbody>
<tr>
<td>The onset of symptoms is 10-30 minutes after ingestion the fish, which is said to have a characteristic <em>peppery bitter</em> taste.</td>
<td>Nonspecific: diffuse, macular, blanching erythema and hives</td>
</tr>
<tr>
<td>Flushing</td>
<td></td>
</tr>
<tr>
<td>Palpitations</td>
<td></td>
</tr>
<tr>
<td>Headache</td>
<td></td>
</tr>
<tr>
<td>Nausea and Diarrhea</td>
<td></td>
</tr>
<tr>
<td>Sense of anxiety</td>
<td></td>
</tr>
<tr>
<td>Prostration or loss of vision (rare)</td>
<td></td>
</tr>
<tr>
<td>Tachycardia and wheezing</td>
<td></td>
</tr>
<tr>
<td>Hypotension or hypertension</td>
<td></td>
</tr>
</tbody>
</table>
# Scombroid

**Diagnostic Pearls**

- Disease of acute onset and short duration
- Diagnosis is clinical; no laboratory tests are necessary.
- If the diagnosis requires confirmation, histamine levels can be measured in the suspect frozen fish

**Management**

- ECG, IV access, oxygen, and cardiac monitoring as needed.
- Treat bronchospasm as needed
- Treat with antihistamines: H1- and H2-blockers.
- Consider use of activated charcoal only if presentation is very early and a large amount of fish was ingested.
Case report

• A 51-year-old woman was brought to the hospital after a close friend found her semiconscious, obtunded, and listless.

• On Sunday, she appeared healthy, alert, and talkative. The next morning, she began to experience episodic chills lasting 30 to 40 minutes.

• As the day progressed, her appetite waned as she became weaker. That evening, her lethargy was pronounced.

• The patient had a medical history of chronic active hepatitis B virus (HBV) infection.

http://www.residentandstaff.com/article.cfm?ID=281
Case report

• In the ED, she was lethargic and diaphoretic
• She was tachypneic (25-32 breaths/min) & mildly tachycardic (95-105 beats/min), temperature was 103°F and systolic blood pressure between 90 and 100 mm Hg.
• Her sclera were icteric, skin was jaundiced with mild generalized edema.
• Auscultation of her abdomen revealed decreased bowel sounds.
• Palpation of the abdomen revealed diffuse tenderness, and a liver edge was noted 2 to 3 cm below the costodiaphragmatic angle
Case report

- Edema of the legs was noted, with the right being more swollen than the left.
- The right leg was erythematous and exquisitely tender.
- Two prominent blisters, approximately 4 and 6 cm in diameter, soft and compressible and filled with serous fluid.

http://www.residentandstaff.com/article.cfm?ID=281
Case Report

• On the third day, debridement of the right leg was necessary.
• The surgical specimen taken from the right ankle grew a bacillus species later identified as *Vibrio vulnificus*.
• *It was discovered that she had purchased a can of oysters but could not recall if she consumed it.*

http://www.residentandstaff.com/article.cfm?ID=281
**Vibrio vulnificus**

June 04, 1993 / 42(21);405-407


July 26, 1996 / 45(29);621-624

**Vibrio vulnificus Infections Associated with Eating Raw Oysters -- Los Angeles, 1996**
Vibrio vulnificus causes wound infections, gastroenteritis or a serious syndrome known as "primary septicema."
# Vibrio vulnificus

<table>
<thead>
<tr>
<th>Mode of Transmission</th>
<th>Clinical Manifestations</th>
<th>Dermatologic Manifestations</th>
</tr>
</thead>
</table>
| Transmitted to humans through open wounds in contact with seawater or through consumption of certain improperly cooked or raw shellfish. | - Gastroenteritis: usually develops within 16 hours of eating the contaminated food<br>- Sepsis: 60% case fatality<br>Over 70 percent of infected individuals have distinctive bullous skin lesions. | From hematogenous spread or from direct inoculation
Bullous skin lesions |

Avoid raw clams and oysters!
Vibrio vulnificus
Vibrio vulnificus

• High Risk Conditions Predisposing to *Vibrio vulnificus* infection:
  – Liver disease, either from excessive alcohol intake, viral hepatitis or other causes
  – Hemochromatosis
  – Diabetes mellitus
  – Stomach problems, including previous stomach surgery and low stomach acid (for example, from antacid use)
  – Immune disorders, including HIV infection
  – Long-term steroid use (as for asthma and arthritis).
## Vibrio vulnificus

<table>
<thead>
<tr>
<th>Diagnostic Pearls</th>
<th>Culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>- A physician should suspect <em>V. vulnificus</em> if a patient has watery diarrhea and has eaten raw or undercooked oysters or when a wound infection occurs after exposure to seawater</td>
<td>Vibrio organisms can be isolated from cultures of stool, wound, or blood the laboratory should be notified as a special growth medium is preferred</td>
</tr>
<tr>
<td></td>
<td>RX: Doxycycline or a third-generation cephalosporin (e.g., ceftazidime)</td>
</tr>
</tbody>
</table>
Hot tub party
Pseudomonas Dermatitis/Folliculitis Associated With Pools and Hot Tubs -- Colorado and Maine, 1999--2000

• The Colorado Department of Public Health and Environment (CDPHE) was notified of approximately 15 persons with folliculitis after they had used a hotel pool and hot tub.

• The Maine Bureau of Health (MBOH) was notified of several cases of dermatitis/folliculitis among persons who had stayed at Hotel A in Bangor, Maine, during February 18--27, 2000.

www.cdc.gov/mmwr/preview/mmwrhtml/mm4948a2.htm
*P. aeruginosa,* **ubiquitous** **gram negative organism** found in soil and fresh water.

Gains entry through hair follicles or via breaks in the skin.

Minor trauma from wax depilation or vigorous rubbing with sponges may facilitate the entry of organisms into the skin.

Hot water, high pH (>7.8), and low chlorine level (<0.5 mg/L) all predispose to infection.
**Pseudomonas Dermatitis/Folliculitis**

The rash onset is usually 48 hours (range, 8 h to 5 d) after exposure to contaminated water, but it can occur as long as 14 days after exposure.
**Pseudomonas Dermatitis/Folliculitis**

- Lesions begin as pruritic, erythematous macules that progress to papules and pustules.
- Lesions involve exposed skin, but they usually spare the face, the neck, the soles, and the palms.
- The rash usually clears spontaneously in 2-10 days, rarely recurs, and heals without scarring.
# Systemic symptoms have been reported

Number and percentage of case patients with *Pseudomonas* dermatitis/folliculitis* associated with hot tub use, by symptom - Colorado, 1999

<table>
<thead>
<tr>
<th>Symptom</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rash</td>
<td>19</td>
<td>(100)</td>
</tr>
<tr>
<td>Fatigue</td>
<td>11</td>
<td>(58)</td>
</tr>
<tr>
<td>Lymphadenopathy</td>
<td>10</td>
<td>(53)</td>
</tr>
<tr>
<td>Fever</td>
<td>8</td>
<td>(42)</td>
</tr>
<tr>
<td>Joint pain</td>
<td>7</td>
<td>(37)</td>
</tr>
<tr>
<td>Muscle aches</td>
<td>6</td>
<td>(32)</td>
</tr>
<tr>
<td>Nodules on feet</td>
<td>5</td>
<td>(26)</td>
</tr>
<tr>
<td>Nodules on hands</td>
<td>5</td>
<td>(26)</td>
</tr>
<tr>
<td>Chest pain</td>
<td>4</td>
<td>(21)</td>
</tr>
</tbody>
</table>

* n = 19

Systemic symptoms have been reported.
**Pseudomonas Dermatitis/Folliculitis**

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Clinical presentation and history</td>
<td>• <em>P aeruginosa</em> is usually a self-limited infection, clearing in 2-10 days.</td>
</tr>
<tr>
<td>• The diagnosis is best verified by results of bacterial culture growth from either a fresh pustule or a sample of contaminated water.</td>
<td>• For complicated cases: associated mastitis, persistent infections, a course of ciprofloxacin (500 or 750 mg PO bid) is advised</td>
</tr>
<tr>
<td>• Gram stain of a pustule</td>
<td></td>
</tr>
</tbody>
</table>
Conclusion

• Although uncommon, leisurely activities can predispose to certain infections either by personal or environmental contact, tick arthropod vectors, or ingestion of pathogens.

• Fever and rash are important clinical presentations of infectious diseases including gonococcemia, meningococcemia, RMSF, *Ehrlichiosis*, scombroid, *V. vulnificus* and *Pseudomonas* folliculitis.

• Although confirmatory diagnostic tests are available, history, clinical presentation and epidemiologic clues are essential for the making the diagnosis.