OBJECTIVES

1. Discuss the clinical presentation and epidemiology of common zoonoses
2. Discuss the transmission methods of common zoonoses
3. Discuss the current therapies for common zoonoses

Question # 1

A 7-year old boy develops fever, headache, severe myalgias, and a dark rash on the hands and arms over a 5-day period upon returning from a trip to North Carolina. On physical examination, he is febrile to 39°C, has meningismus, and a petechial rash on his upper extremities. Lab findings reveal:

- WBC 3,000/mm³
- Platelet count 90,000
- Serum sodium 129 mEq/L
Q1: Which is a true statement concerning the most likely diagnosis in this child?

A. Serum serologic tests performed early in the course of the illness will likely demonstrate evidence of infection
B. Ceftriaxone will be effective therapy
C. Bone marrow examination will be required to reveal the etiology
D. Supportive therapy without antibiotics is the mainstay of therapy
E. Doxycycline should be administered

ROCKY MOUNTAIN SPOTTED FEVER

SYMPTOMS
- Fever and myalgias
- Headache
- Nausea and anorexia
- Rash
  - maculopapular to petechial
  - extremities inward

LABORATORY
- Thrombocytopenia
- Hyponatremia
- Leukopenia/anemia
- Elevated liver enzymes, bilirubin
- Increased BUN

Tick bite
- Wild animals/dogs primary reservoir
- April to September
- <15 years old (2/3)
- Death with delayed diagnosis
- Incubation 2-14 days

http://www.cdc.gov/ncidod/dvrd/rmsf/epi4.htm
ROCKY MOUNTAIN SPOTTED FEVER

• D/DX
  —Meningococcemia; atypical measles; HSP; Enteroviruses; Ehrlichiosis
• Diagnosis
  —Serology assays not sensitive in the first week
  —Fluorescent or peroxidase-tagged antibody tests from skin lesions-rapid and highly specific diagnosis
• Therapy
  —Doxycycline drug of choice at any age
Question # 2

In July, a 10-year old girl develops fever, headache, and abdominal pain after returning from a fishing trip in Missouri one week ago. On physical examination, she is febrile to 39° C, has meningismus, but no rash is present.

Q2: Which of the following laboratory findings is least likely to be found in this child?
A. Thrombocytopenia
B. Elevated liver enzymes
C. Hyponatremia
D. Leukocytosis
E. Anemia

EHRLICHIOSIS

<table>
<thead>
<tr>
<th>DISEASE</th>
<th>AGENT</th>
<th>VECTOR</th>
<th>WHERE</th>
</tr>
</thead>
<tbody>
<tr>
<td>HME</td>
<td>E. chaffeensis</td>
<td>Lone star tick</td>
<td>Southeast, South central &amp; Midwest</td>
</tr>
<tr>
<td>HGE</td>
<td>Anaplasma</td>
<td>I. scapularis</td>
<td>Northeast, North central &amp; N. California</td>
</tr>
<tr>
<td>Granulocytic</td>
<td>E. ewingi</td>
<td>Lone star tick</td>
<td>Southeast, South central &amp; Midwest</td>
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</tbody>
</table>

*Reservoirs*
- white-tailed deer
- white-footed mouse
EHRLICHIOSIS

- Clinical Features
  - Similar to RMSF
  - Less rash
  - More anemia, leukopenia, thrombocytopenia, hyponatremia without hyperglycemia

- Diagnosis
  - Intraleukocytic inclusions (morulae) and serology

- Treatment
  - Doxycycline

Intraleukocyttoplasmic cluster (morulae)
• Question #3: A previously healthy 7 year old girl who has returned from rural Arkansas, where she was visiting relatives, develops high fever, myalgias, pharyngitis and swollen glands in her right neck. On physical exam, she has a small papule in her right neck with regional tender lymphadenopathy just inferior to the papule. Blood culture grows a small gram-negative coccobacillus.

• Which of the following is the most common route of transmission of this organism?
  A. Aerosol inhalation
  B. Direct animal exposure
  C. Tick bite
  D. Contaminated water
  E. Fecal-oral spread

TULAREMIA

• Francisella tularensis
  — Central states (Arkansas, Missouri, TN, Texas)
• Tick bite most common route of transmission
• Other modes:
  — Direct animal exposure
  — Aerosolization
  — Ingestion contaminated meat or water
• Important reservoirs: rabbits, hares, ticks
• Diagnosis: History of exposure to the organism (tick bite) with clinical picture; serology
• Treatment: Streptomycin or Gentamicin

TULAREMIA

• Types
  — Ulceroglandular 45%
  — Glandular 25%
  — Oculoglandular 2%
  — Pneumonic 14%
  — Oropharyngeal 4%
  — Typhoidal
  — Intestinal

• Signs/Symptoms
  — Lymphadenopathy 96%
  — Fever 87%
  — Pharyngitis 43%
  — Ulcer/papule 45%
  — Myalgias 39%
  — Arthralgias 39%
  — HSM 35%
A 12 year old boy returns from summer camp in New York and is noted to have a left 7th cranial nerve palsy. He is also noted to have a rash on his back which consists of a large ring with a clear center.

Q4: Of the following, the most appropriate next step in management is to

- A. Obtain a biopsy of the perimeter of the skin lesion for *Borrelia* culture or PCR
- B. Obtain serum serologic studies for *Borrelia*
- C. Treat the patient with oral doxycycline orally
- D. Treat the patient with intravenous ceftriaxone
LYME DISEASE

• Pathogen: *Borrelia burgdorferi*

• Manifestations
  - Erythema migrans
  - Fever, malaise, headache, arthralgia
  - Arthritis, non-symmetric, large joints
  - Carditis
  - Neurological
    - VII nerve palsy
    - Aseptic meningitis

LYME DISEASE: TREATMENT

• Doxycycline (≥ 8 years) or amoxicillin
  - Early disease: 14-21 days
  - Multiple rings: 21 days
  - Isolated VII nerve palsy: 21-28 days
  - Arthritis: 28 days

• Ceftriaxone 100 mg/kg/day (2 gm max) for 14-21 days (PCN is alternative)
  - Arthritis: persistent or recurrent (or repeat oral)
  - Carditis
  - Meningitis/encephalitis (14-28 days)
Question #5

During a camping trip in the Rocky Mountains, a 15 year old boy reports that he scraped his leg and then waded across several streams. He now presents with fever, headache, non-purulent conjunctivitis and myalgias. He appears jaundiced.

Q5: All of the following are indicated except:

A. Evaluation of liver enzymes
B. Hepatitis A immunoglobulin
C. Intravenous penicillin
D. Electrocardiogram

LEPTOSPIROSIS

• No vector
  —Invade skin through mucous membrane or skin
• Rodents(rats) and dogs usual reservoir
  —Exposure to contaminated water and soil
  —Swimming in farm ponds
  —Work in slaughter houses
• Subclinical infection - most common
• Anicteric form: 90%-milder
• Icteric form (Weil’s): 10%–severe
LEPTOSPIROSIS

- Septicemic phase (lasts 3-7 days)
  - Sudden onset fever, HA, conjunctivitis
  - Brief improvement (1-3 days)

- Immune phase
  - Low or no fever, Severe HA/meningitis (aseptic)
  - Myalgias
  - Conjunctivitis, Rash, Extensive vasculitis

- Weil’s Disease (10% have this severe form)
  - Hepatocellular/renal/cardiac involvement
  - Hemorrhagic pneumonitis
  - 5-40% mortality

**Diagnosis**

- Serology-most common mode
- Culture of spirochete in the dark
  - CSF or Blood-septicemic phase
  - Urine-immune phase

**Treatment**

- Self-limited disease supportive care
- Severe disease with intravenous penicillin G
- Mild disease with doxycycline (> 8 years old)
- Alternative is ceftriaxone

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**Question #6**

- 5 days after being bitten by a pet mouse, a 7 year old child develops abrupt onset of fever, chills, rash on the extremities (see next slide), muscle pain and vomiting. You suspect rat-bite fever.
Q6: Blood culture will most likely grow:

A. *Pasteurella multocida*
B. Group A streptococcus
C. *Streptobacillus moniliformis*
D. *Eikenella corrodens*
E. *Bacteroides fragilis*

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**RAT-BITE FEVER**

*Zoonotic illness*
— transmitted by bites of rats, squirrels, mice

*Etiology*
— *Streptobacillus moniliformis* in the US
— *Spirillum minus* — more common in Asia

*Clinical Features*
— Incubation period of 3-21 days
— Fever, chills, rash on extremities, myalgias, vomiting
— Pneumonia, endocarditis, meningitis

*Treatment*
— Penicillin G
— Doxycycline for PCN allergic patients
ANSWERS TO QUESTIONS

1. E
2. D
3. C
4. C
5. B
6. C