Brucella species
Brucellosis

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Brucellosis

- A zoonotic disease caused by any of 4 *Brucella* spp.: *abortus*, *melitensis*, *suis*, and *canis* (rarely)
- Infective dose = 10-100 organisms
- Fever profuse sweating, malaise, headache and muscle/back pain.
- Undulant fever
Brucellosis

Although brucellosis is highly endemic in many countries (Peru, Mexico, Spain, Greece, Iraq, Iran, Jordan, and Kuwait), it is rare in the U.S., with approximately 100 cases per year.

The most common mode of brucellosis transmission is the consumption of unpasteurized dairy products. Brucellosis can also be transmitted through direct contact with infected animal tissues and bodily fluids, and is an occupational hazard for farmers, veterinarians, butchers, and laboratory workers.
Brucellosis

- Incubation period: 5 days to 6 months
- Duration of illness: weeks to months
- Mortality: <5%
- Treatment: doxycycline and rifampin 6 weeks
- Prophylaxis: same, 3-6 weeks
Brucellosis: Transmission

- Unpasteurized dairy products (most common)
- Direct skin contact (occupational hazard)
- Aerosols (highly infectious; easily aerosolized)
Clinical significance

- *B. melitensis* - most severe and more acute
- *B. abortus* - more chronic
- *B. suis* – severe, associated with osteomyelitis
- *B. canis* – very rare in humans
- *B. melitensis* and *B. suis* most easily aerosolized, studied as biological weapons agents, therefore primary BT agents of concern
Direct Specimen Sources

1. **Blood or bone marrow**: *Brucella* spp. are most often isolated from these specimens.

2. **Serum**: An acute-phase specimen should be collected as soon as possible after onset of disease. A convalescent-phase specimen should be collected >14 days after the acute specimen.

3. **Spleen, liver, or abscess**: *Brucella* spp. are occasionally isolated from these sources. Selective media can be used for isolation of *Brucella* spp. From specimens with mixed flora.
Specimens that may be received in the BTRU

- Blood culture isolate
- Milk
- Laboratorians post exposure sera
- Biopsy specimen
Gram Stain

- Poorly staining, tiny gram negative coccobacilli (0.4 x 0.8 μm)
Colony morphology

- Colonies are non-pigmented and non-hemolytic
- Appear as punctate colonies after 48 hour incubation
Growth

- **Incubate at 35°-37°C; CO₂ enriched atmosphere**
- **use media such as 5% SBA, CA, MAC, and/or Thayer-Martin agar**
- **Growth on MAC will be negative or poor for most *Brucella* spp.**
Biochemical Reactions

- Oxidase – positive
- Nitrate – positive
- Urease – positive
- Catalase – positive
- Satellite - negative
Confirmatory tests:
Hydrogen sulfide production
Confirmatory tests

Susceptibility to Brucella phage Tbilisi

- *B. abortus* strains, with the exception of the *B. abortus RB51* vaccine strain, are susceptible to lysis with the Tbilisi phage.
- *B. suis* strains are susceptible to lysis using a higher concentration of Tbilisi phage.
- *B. melitensis* strains exhibit no lysis in the presence of Tbilisi phage.
## Dye Tolerance Speciation

<table>
<thead>
<tr>
<th>Organism</th>
<th>Biovar</th>
<th>Thionin</th>
<th>Basic fuchsin</th>
<th>Control Plate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1:25,000</td>
<td>1:50,000</td>
<td>1:100,000</td>
</tr>
<tr>
<td><strong>B. abortus</strong></td>
<td>Biovar 1 &amp; 4</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>B. melitensis</strong></td>
<td>Biovars 1-3</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td><strong>B. suis</strong></td>
<td>Biovar 1</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td><strong>B. canis</strong></td>
<td>N/A</td>
<td>-</td>
<td>+</td>
<td>+</td>
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</tbody>
</table>
Reference

Information and pictures from:


Questions?