Three recent laboratory-associated Brucella incidents resulting in >70 exposures, New York City, 2015

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Brucella

- Small, slow-growing Gram negative coccobacilli
- Primary human pathogens: B. melitensis, B. abortus, and B. suis (B. canis rarely causes infection)
- Readily aerosolized during routine lab work (e.g., opening plates, subculturing)

Brucellosis

- Common zoonotic disease in much of the world
  - Rare in the US; 2 – 3 cases annually in NYC.
- Risk factors
  - Consumption of unpasteurized milk or milk products (typically in endemic country)
  - Exposure to infected farm animal or feral pig
  - Lab work with unrecognized Brucella isolate on open bench
- Infectious dose extremely low
- Incubation period typically 2 – 4 weeks (can be as long as 5 months)
- Symptoms: intermittent or undulant fever; sweats; fatigue; joint pain
- If not treated early, can persist as chronic, debilitating illness

Hospital and Lab A

Initial Evaluation

- 4/15/15
  - Patient presents to NYC hospital, traveling directly from JFK Airport, with >1 week of severe neck pain
  - In Mauritania 6 – 9 months
  - EMR notes: denies fever, chills or night sweats
  - In ED, temperature increases to 101.9°F
  - Two days later, ID physician elicits history of 4 months of recurrent fever, 8 – 10 lb. weight loss and anorexia
- Differential dx includes HIV, leptospirosis, mosquito- and tick-related infections, but not brucellosis
Hospital and Lab A
Illness Course

- After >70 hours of incubation, 2 blood culture sets flagged for growth
  - Bottles vented and Gram stained in biological safety cabinet (BSC)
  - Gram stain: small Gram negative coccobacilli
  - Work with isolate performed on open laboratory bench for one week
  - NYC Department of Health and Mental Hygiene (DOHMH) contacted after outside laboratory identifies presumptive *Brucella* sp.
  - Re-interviewed, patient reports consumption of raw cow, goat and camel milk when in Africa

Assessment of Exposure Risk After Laboratory *Brucella* Incident

- High-risk exposure
  - Direct personal exposure to isolate (e.g., sniffing; skin contact; pipetting by mouth; spraying into eyes, etc.)
  - Working with isolate on open bench
  - Being within 5 feet of laboratorian working with isolate on open bench
  - Being in laboratory at any time when procedure conducted on open bench that can aerosolize brucellae (e.g., venting blood culture bottles, catalase testing, or vortexing)

- Low-risk exposure
  - Being present in laboratory when others working with isolate, though not meeting high-risk definition

CDC *Brucella* spp. Post-Exposure Recommendations

<table>
<thead>
<tr>
<th>Antimicrobial PEP</th>
<th>2008 Recommendations</th>
<th>2012 Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Risk</td>
<td>Doxycycline + rifampin x 3 weeks or TMP-SMX + rifampin x 3 weeks*</td>
<td>No changes</td>
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<tr>
<td>Low Risk</td>
<td>Discuss PEP, make available</td>
<td></td>
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<thead>
<tr>
<th>Serologic Monitoring</th>
<th>2008 Recommendations</th>
<th>2012 Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline, 2, 4, 6, 24 weeks post-exposure (after last known exposure)</td>
<td>Baseline, 6, 12, 18, 24 weeks post-exposure (after last known exposure)</td>
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<tr>
<th>Symptom Surveillance</th>
<th>2008 Recommendations</th>
<th>2012 Recommendations</th>
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<tr>
<td>Regular (e.g., weekly) symptom watch and daily self-temperature checks for febrile illness through 24 weeks post-exposure (after last known exposure)</td>
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* For exposures to *B. abortus* RB51 veterinary vaccine strain, rifampin not included
Incident Management Challenges

- Discerning risk is not clear-cut
  - Recalling when particular lab work took place and who may have been exposed
  - Assessing risk in persons who briefly traverse lab
  - Determining the shared air space
- Long-term commitment needed by hospital employee health to manage follow-up logistics
- Some at-risk employees (e.g., pregnant or immune suppressed) will refuse prophylaxis and serological surveillance

Summary of Recent NYC Laboratory Incidents

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<thead>
<tr>
<th>Lot A</th>
<th>Lot B</th>
<th>Lot C</th>
<th>Lot D</th>
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<tbody>
<tr>
<td>Disc DCOHM infected</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Fever</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Trauma history</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Breathing symptoms?</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Risk factor?</td>
<td>Yes</td>
<td>No</td>
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</table>

- If BCA isolated before flagged >70 >100 >50 80
- BCA isolated or open bench? | Yes | Yes | Yes | Yes |
- BCA Gram stained on open bench? | Yes | Yes | Yes | Yes |
- Gram stain results | Small GN acidophilic | Small GP | Small GN acidophilic | Small GN acidophilic |
- Isolates moved on open bench? | Yes | Yes | Yes | Yes |
- Contact Health Department when Brucella spp. cannot be ruled out
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Biosafety Steps to Prevent Exposure to Brucella spp.

- Vent all blood culture bottles in Class II or higher BSC
- Use BSC when working with unknowns, and especially slow-growing Gram negative organisms
- Review ASM protocols for ruling out and referring potential biological threat agents (BTA), including Brucella spp.
- Contact the Health Department when Brucella spp. cannot be ruled out
- Do not attempt identification of isolate with instruments or automated systems in lieu of referring a possible Brucella isolate to Public Health Laboratory