Brucellosis

Organism: *Brucella* spp. (*abortus*, *melitensis*, *suis*, *canis*; each with several biogroups) small gram negative pleomorphic coccobacilli. Different species may cause illness of varying severity (*melitensis* and *suis* >> *abortus* and *canis*). Generally, brucellosis can cause a variety of symptoms/manifestations, e.g., undulant fever, endocarditis, deep seeded abscesses. Alaska cases have been associated with exposure to infected caribou/reindeer (*B. suis* serovar 4). Brucellae have been detected in marine mammals and there is ongoing research to determine what kind of zoonotic risk this presents. The species associated with marine mammals have been difficult to characterize; there are only two human case reports with such species.

Incubation period: ~5 to 60 days, variable and usually difficult to ascertain.

Infectious period: Person-to-person communicability documented rarely.

Transmission route:

a. Contact of broken skin with animal tissues, blood, urine, vaginal discharges, aborted fetuses and placentas.
b. Consumption of raw, unpasteurized milk/cheese.
c. Airborne infection for animals in pens and stables; and for humans, in labs and slaughter houses.
d. Rarely infection from auto-inoculation with animal vaccine.
e. Concern for aerosols in a bioterrorist attack.

Treatment: General recommendations: doxycycline and rifampin, or streptomycin for at least 6 weeks treatment. In severely ill patients, corticosteroids may help. Note that animal vaccine-induced infections are resistant to some antibiotics. TMP-SZ is effective but relapses are common. Relapses may also occur in some patients treated with doxy/rif due to sequestered (as opposed to resistant) organisms. **Note:** treatment should be tailored to the specific patient. CCDM 2015 manual can be used, as well as consult with an infectious disease clinician for a specific regimen.

CDC does not have specific guidance on post-treatment serologic monitoring; however, serial titers can be used to demonstrate response to treatment. Blood can be collected at 30, 60, 90 and 180 days post-treatment.

Prophylaxis is not generally indicated for asymptomatic persons who shared an exposure; however, there are specific recommendations for lab workers handling samples with inadequate biosafety controls: see http://jcm.asm.org/content/51/9/3132.full.pdf+html and Control and Contact Measures on page 3.

Information Needed for the Investigation

Verify the Diagnosis

Clinical description: an illness characterized by acute or insidious onset of fever, night sweats, undue fatigue, anorexia, weight loss, headache, and arthralgia.

Laboratory criteria for diagnosis:

- Isolation of *Brucella* spp. from a clinical specimen, or
- Fourfold or greater rise in *Brucella* agglutination titer between acute- and convalescent-phase serum specimens obtained greater than or equal to 2 weeks apart and studied at the same laboratory, or
- Demonstration by immunofluorescence of *Brucella* spp. in a clinical specimen.

Determine the Extent of Illness

- Determine if cluster exists depending on suspected exposure source.
- If animals are suspected as the source, contact the State Veterinarian's Office: Bob Gerlach 375-8214; Jay Fuller -8213 (main 907-375-8200). They will likely be collecting serologic samples for livestock. Response will depend upon the type of brucellosis confirmed and the type of animals involved.
- If food products are suspected to be the source, obtain a list of all persons who may have consumed the food. Contact and interview as for a foodborne outbreak.
- If food product is commercially available, contact DEC.
- If food/meat product was brought into Alaska illegally, may need to contact customs and border patrol officials (271-1236) as well as the federal veterinarian:

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  USDA Veterinary Medical Officer (VMO) - Alaska
  Ph: 907-688-1229 or 907-745-3253; Cell: 907-529-7784
  Fax: 907-688-1239 or 907-746-0873
  rosemarie.t.lombardi@aphis.usda.gov

Laboratory Specimens

****Notify Lab prior to submission; specimens require Select Agent biosafety precautions.****

- ASPHL can work with: whole blood and serum; bone marrow; spleen, liver; abscess or lesion exudates; lymph node aspirates; NP swabs; bronchial/tracheal washings; and animal/environmental samples.
- ASPHL can do PCR from isolates, blood/serum and environmental samples. PCR positive results would be presumptive not confirmatory.
- ASPHL has an antibody-based test only for serum of exposed personnel; any positive results would be presumptive from this test, also. The test is the BMAT (*Brucella* microagglutination test).
- NOTE that testing at commercial labs may not be a quantitative assay (as for a true titer). Interpret results in light of the clinical picture and recommend additional confirmatory testing, i.e., culture or demonstration of 4-fold increase in titer.

- Consult with ASPHL about culture of food or animal parts that are suspected to be the source of infection. Depending on the specific incident and suspected food types, testing may occur at several different labs, i.e., ASPHL, NVSL (Ames, IA), or CDC.
    - Brucellae are difficult to detect/culture from meat samples: lymphatic tissues, lymph nodes, bone marrow, or organs are more likely to yield positive results than steaks or other cuts of meat.

Contact and Control Measures

- None indicated if exposure determined to be from outside Alaska (e.g., consumption of unpasteurized products in Mexico).
- If suspected food product is still available, consider collecting a sample for testing. Counsel patient/family members that food products should be thoroughly cooked or discarded.
- Counsel persons associated with caribou exposure to cook meat well and take care when boning out carcass.
- Discuss any potential exposures with laboratory staff in any of the facilities where the specimen may have transited. See attached Lab Exposure Questionnaire that can be used to determine possible risk/follow-up needed for staff. In general, these assessments and the oversight of blood draws and possible PEP fall to the Lab Micro Manager and/or facility Employee Health staff. SOE can assist as needed.
- Consider the potential of a bioterrorist attack; involve appropriate personnel accordingly.
- If dogs are suspected as a source of human infection, NASPHV has guidance for *B. canis* exposures and potential response is available at: http://www.nasphv.org/Documents/BrucellaCanisInHumans.pdf

Hospital Considerations

- Use Standard Precautions.
- Direct transmission is extremely rare. Mothers who are breast-feeding may transmit to their infants. Sexual transmission has also been reported. For both sexual and breast-feeding transmission, if infant or person at risk is treated, their risk for becoming infected will be eliminated within 3 days.

Reporting Requirements

- FTR: write up cluster investigations
- AK STARS: enter all *confirmed* and *probable* cases.
- CDC Case Definition is used to define *confirmed* and *probable* cases.
- CDC will request an official Brucellosis Case Report Form available at: http://www.cdc.gov/brucellosis/pdf/case-report-form.pdf
- Because brucellosis is a Select Agent, when notifying partners of a suspected/confirmed case, be sure to notify Preparedness regardless of whether the case appears to be a potential bioterror threat.
- If *Brucella spp.* are confirmed in any specimens, ASPHL is required to ask laboratories in the specimen referral pathway to complete Forms 3 and 4 as part of the Select Agent

requirements. ASPHL takes care of this; forms are available here FYI: http://www.selectagents.gov/Forms.html

Resources

ADFG Division of Wildlife Conservation information on brucellosis in animals
http://www.adfg.alaska.gov/index.cfm?adfg=disease.general3

ANTHC Center for Climate and Health Bulletin on *Brucellosis: Answers to Frequently Asked Questions*
http://anthc.org/wp-content/uploads/2016/01/CCH-Bulletin-No-6-Brucellosis.pdf

Nunavut Department of Environment brochure on *Brucellosis: What you should know*
http://env.gov.nu.ca/sites/default/files/Brucellosis_Final%20(ENGLISH).pdf

References

- Centers for Disease Control and Prevention (CDC) brucellosis website: http://www.cdc.gov/brucellosis/
- Siegel JD, Rhinehart E, Jackson M, Chiarello L, and the Healthcare Infection Control Practices Advisory Committee. 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings. Available at http://www.cdc.gov/hicpac/pdf/isolation/isolation2007.pdf