

Brucella species as Bioterrorist Agents

Agent: *Brucella* species are Gram-negative cocco-bacillary organisms, of which four are pathogenic in humans (*Brucella melitensis*, *B. abortus*, *B. canis* and *B. suis*). They are highly infectious via the aerosol route, especially *B. melitensis* and *B. suis*. Contamination of food may also be used as a vehicle for transmission. Most infections are asymptomatic under natural conditions; however, a large aerosol dose may increase the clinical attack rate. Attack with these organisms would probably have low mortality, and therefore be used as incapacitating agents.

Disease: Brucellosis

Incubation Period: 3-60 days (Respiratory brucellosis has a shorter incubation period than foodborne brucellosis)

Signs/Symptoms: Brucellosis normally presents as a nonspecific febrile illness with a long and variable incubation period. Characteristic "undulant" fever, headache, chills, myalgias, arthralgias, weakness and malaise are the most common complaints. Pulmonary complications are rare. Gastrointestinal symptoms occur in ingestion cases, but may also appear in inhalation cases; these symptoms include constipation, anorexia, nausea, and diarrhea. One or both sacroiliac joints may become infected causing low back and buttock pain that is intensified by stressing the sacroiliac joints on physical exam. Peripheral joint involvement may occur and vary from pain on range of motion testing to joint immobility and effusion. Hepatomegaly or splenomegaly may occur in up to 45-63% of cases. Meningitis occurs occasionally (<5% of cases). Symptoms may persist from 3-6 months and sometimes for over a year.

Diagnosis:

Differential Diagnosis: A very broad differential diagnosis is necessary due to the nonspecific symptoms and include bacterial, viral, and mycoplasmal infections. The symptoms of viral and mycoplasmal infections are usually only present for a few days, while in brucellosis they persist for long periods. Typhoidal tularemia and typhoid fever may be indistinguishable clinically from brucellosis. Radiographic findings similar to those in tuberculous infection may occur, including disk space narrowing and epiphysitis.

Diagnostic Tests: When brucellosis is suspected, multiple blood cultures should be

obtained. Additional specimens may include infected tissue, abscesses and bone marrow, and spleen and liver biopsies. Blood and bone marrow cultures collected during the acute febrile phase will yield a positivity rate of 15-70% and 92% respectively. Early postexposure (0-24 hours) nasal swabs, sputum, and induced respiratory secretions may be collected for culture. Acute phase sera should be collected at onset with convalescent sera 14-21 days after onset. A fourfold increase in serum agglutination titers on a single titer of $\geq 1:160$ is indicative of brucellosis. Due to similarities in the differential diagnosis and potential cross reactions with *Francisella tularensis*, it may be advisable to obtain agglutination titers for both *Brucella* and *Francisella*.

Laboratory: The first indication of brucellosis may be the isolation of *Brucella* spp. from a blood culture. If *Brucella* is suspected by the clinician, cultures should be held longer than 7 days and blood cultures up to 30 days. If a tiny gram negative rod that is both oxidase and urease positive, but negative for X and V factors is found, laboratorians should be alerted to the possibility of *Brucella* spp. When this occurs, all additional culture manipulations should be within a biological safety cabinet. Isolates should be sent to the **Oregon State Public Health Laboratory** (OSPHL) immediately. Confirmation of isolates may take up to three to four days.

Specimens suspected of containing *Brucella* or isolates thought to be *Brucella* spp. are considered to be “infectious agents” by the Department of Transportation (29 CFR Parts 171-189, <http://hazmat.cot.gov/rules.htm>) and must be shipped accordingly. Contact the OSPHL for further information on the shipping of infectious organisms at (503) 229-5882 and Acute and Communicable Disease Prevention at (503) 731-4024. The OSPHL address is 1717 SW Tenth Avenue, Portland, OR 97201. Prior notification is requested if you suspect *Brucella*.

Supportive Tests: Anemia, leukopenia, and thrombocytopenia are common. The chest x-ray may be normal or may reveal bronchopneumonia, interstitial pneumonitis, pleural effusions, enlarged hilar lymph nodes, or single or miliary nodules. Paravertebral abscess may be evident on CT scan or MRI. CT scans often show vertebral sclerosis. Leukocyte count, while usually normal, may be low. Technetium or Gallium-67 bone scans are 90% sensitive for detecting sacroileitis and will also detect other sites of bone and joint involvement.

Treatment: Doxycycline 100 mg bid po plus rifampin 600 mg qd po for a minimum of six weeks. Ofloxacin 400 mg qd po plus rifampin 600 mg qd po for 6 weeks is also effective.

Infection Control: Health care workers should exercise standard precautions. Laboratory workers need to be especially careful. Person-to-person transmission has been noted but is insignificant. Decontamination can be accomplished with a 0.5% sodium hypochlorite solution (1 part household bleach added to 9 parts water). Proper treatment of water, through boiling, chlorination or iodination would also be important in areas subjected intentionally to *Brucella* aerosols.

Report: Immediately report any suspect cases to your local health department or the Oregon Health Division at (503) 731-4024 during working hours (8:00 am to 5:00 pm Monday through Friday) or (503) 731-4030 nights, weekends and holidays.

Adapted with permission from the Texas Department of Health