

BRUCELLOSIS

Bioterrorism Agent Profiles for Health Care Workers

Causative Agent: Brucellosis is a systemic zoonotic disease caused by one of four *Brucella* species: *B. melitensis*, *B. abortus*, *B. suis*, and *B. canis*. The organism is a small, gram-negative aerobic coccobacillus that grows within monocytes and macrophages.

Routes of Exposure: Transmission to humans occurs through (a) direct contact of infected tissue or body fluids with broken skin or conjunctivae, (b) inhalation of infected aerosols, or (c) ingestion of raw infected meat or unpasteurized dairy products. The primary reservoirs are goats, cattle, sheep, pigs and camels although animals such as elk, caribou, bison, deer and wild and domestic canine animals may be infected. Specifically, cattle and goats can carry *B. melitensis*, cattle can carry *B. abortus*, pigs can serve as reservoirs for *B. suis*, and dogs can serve as a reservoir for *B. canis*.

Infective Dose & Infectivity: 10-100 organisms

Incubation Period: Often 1-2 months, range 5 days to several months.

Clinical Effects: Brucellosis is a systemic infection characterized by an undulant fever pattern. It typically presents as an acute non-specific febrile illness with chills, sweats, headache, fatigue, myalgias, arthralgias, and anorexia. Approximately 15-25% of infected individuals will have cough. A normal chest radiograph is often present. Lymphadenopathy is present in 10-20% of patients, and 20-30% experience splenomegaly. Complications of brucellosis infection include: sacroiliitis, arthritis, vertebral osteomyelitis, epididymo-orchitis, and rarely, endocarditis. Routine labs are usually non-specific. In animals, abortion is the most obvious manifestation of the disease in females and epididymitis in males. The organism is shed in the milk, fetal membranes, and uterine discharges. Thus brucellosis can be both an occupational (veterinarians, farmers) or a foodborne disease.

Lethality: Brucellosis has a very low mortality rate, less than 5% of untreated cases, with most deaths caused by endocarditis or meningitis.

Transmissibility: Person-to-person transmission of brucellosis is extremely rare.

Primary Contaminations & Methods of Dissemination: Likely methods of dissemination would either be through aerosolization or sabotage of food.

Decontamination & Isolation: Patients can be managed using standard precautions. Contact precautions are suggested if draining lesions are present. No airborne isolation is required.

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Laboratory testing: If brucellosis is suspected, the diagnosis is usually made through acute and convalescent serology. *Brucella* can be cultured from blood, bone marrow, or other tissues, but it grows slowly. Additionally, if culture is to be done, the laboratory should be notified that brucellosis is suspected because of the high risk to laboratory workers due to transmissibility of the bacteria.

Therapeutic Treatment: The recommended treatment in adults for brucellosis is doxycycline or doxycycline plus rifampin for 6 weeks. In children under 8 years of age, trimethoprim-sulfamethoxazole is substituted for doxycycline.

Prophylactic Treatment: For cases of accidental inoculation or exposure, doxycycline and rifampin have been used as post-exposure prophylaxis. No approved human *Brucella* vaccine is available.

Differential Diagnosis: Because the initial symptoms are non-specific, the differential diagnosis is broad and includes bacterial, viral and mycoplasmal infections. Brucellosis may be indistinguishable from typhoid fever, or the typhoidal form of tularemia.

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For more information call (602) 364-3289

Frequently Asked Questions About Brucellosis

What is brucellosis?

Brucellosis is an infectious disease caused by the bacteria of the genus *Brucella*. These bacteria are primarily passed among animals, and they cause disease in many different vertebrates. Various *Brucella* species affect sheep, goats, cattle, deer, elk, pigs, dogs, and several other animals. Humans become infected by coming in contact with animals or animal products that are contaminated with these bacteria. In humans brucellosis can cause a range of symptoms that are similar to the flu and may include fever, sweats, headaches, back pains, and physical weakness. Severe infections of the central nervous systems or lining of the heart may occur. Brucellosis can also cause long-lasting or chronic symptoms that include recurrent fevers, joint pain, and fatigue.

How common is brucellosis?

Brucellosis is not very common in the United States, where only 100 to 200 cases occur each year. But brucellosis can be very common in countries where animal disease control programs have not reduced the amount of disease among animals.

Where is brucellosis usually found?

Although brucellosis can be found worldwide, it is more common in countries that do not have standardized and effective public health and domestic animal health programs. Areas currently listed as high risk are the Mediterranean Basin (Portugal, Spain, Southern France, Italy, Greece, Turkey, North Africa), South and Central America, Eastern Europe, Asia, Africa, the Caribbean, and the Middle East. Unpasteurized cheeses, sometimes called "village cheeses," from these areas may represent a particular risk for tourists.

How is brucellosis transmitted to humans, and who is likely to become infected?

Humans are generally infected in one of three ways: eating or drinking something that is contaminated with *Brucella*, breathing in the organism (inhalation), or having the bacteria enter the body through skin wounds. The most common way to be infected is by eating or drinking contaminated milk products. When sheep, goats, cows, or camels are infected, their milk is contaminated with the bacteria. If the milk is not pasteurized, these bacteria can be transmitted to persons who drink the milk or eat cheeses made it. Inhalation of *Brucella* organisms is not a common route of infection, but it can be a significant hazard for people in certain occupations, such as those working in laboratories where the organism is cultured. Inhalation is often responsible for a significant percentage of cases in abattoir employees. Contamination of skin wounds may be a problem for persons working in slaughterhouses or meat packing plants or for veterinarians. Hunters may be infected through skin wounds or by accidentally ingesting the bacteria after cleaning deer, elk, moose, or wild pigs that they have killed.

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Can brucellosis be spread from person to person?

Direct person-to-person spread of brucellosis is extremely rare. Mothers who are breast-feeding may transmit the infection to their infants. Sexual transmission has also been reported. Although uncommon, transmission may also occur via contaminated tissue transplantation.

Is there a way to prevent infection?

Yes. Do not consume unpasteurized milk, cheese, or ice cream while traveling. If you are not sure that the dairy product is pasteurized, don't eat it. Hunters and animal herdsman should use rubber gloves when handling eviscerating animals. There is no vaccine available for humans.

My dog has been diagnosed with brucellosis. Is that a risk for me?

B. canis is the species of *Brucella* species that can infect dogs. This species has occasionally been transmitted to humans, but the vast majority of dog infections do not result in human illness. Although veterinarians exposed to blood of infected animals are at risk, pet owners are not considered to be at risk for infection. This is partly because it is unlikely that they will come in contact with blood, semen, or placenta of the dog. The bacteria may be cleared from the animal within a few days of treatment; however re-infection is common and some animal body fluids may be infectious for weeks. Immunocompromised persons (cancer patients, HIV-infected individuals, or transplantation patients) should not handle dogs known to be infected with *B. canis*.

How is brucellosis diagnosed?

Brucellosis is diagnosed in a laboratory by finding *Brucella* organisms in samples of blood or bone marrow. Also, blood tests can be done to detect antibodies against the bacteria. If this method is used, two blood samples should be collected 2 weeks apart.

Is there a treatment for brucellosis?

Yes, but treatment can be difficult. Doctors can prescribe effective antibiotics. Usually, doxycycline and rifampin are used in combination for 6 weeks to prevent reoccurring infection. Depending on the timing of treatment and severity of illness, recovery may take a few weeks to several months. The death rate from brucellosis is very low.

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