

# PUBLIC HEALTH REFERENCE SHEET

## Brucellosis



<b>Name</b>	<i>Brucella</i> spp. bacteria
<b>Reservoir &amp; Transmission</b>	Cattle, swine, goats, and sheep are most common; also camel, bison, elk, equids, caribou, and some species of deer Ingestion of undercooked meat, raw milk, and dairy products from infected animals; contact with animal tissues and secretions; inhalation when working in laboratories or meat processing facilities
<b>Incubation Period</b>	1–2 months is common, range of 5 days to 5 months
<b>Common Symptoms</b>	Fever, headache, weakness, sweating, arthralgia, myalgia, fatigue, anorexia, weight loss
<b>Gold Standard Diagnostic Test</b>	Isolation by culture
<b>Risk Groups</b>	Occupations with animals or their tissues, in biosafety level 3 laboratories; consuming undercooked meat or unpasteurized dairy products
<b>Geographic Significance</b>	Worldwide; especially Mediterranean basin (Portugal, Spain, Southern France, Italy, Greece, Turkey, North Africa), Eastern Europe, the Middle East, Africa, Asia, India, Central and South America, and Mexico, the Caribbean

### What is brucellosis?

Brucellosis is an acute systemic disease caused by the bacteria of the genus *Brucella*. These bacteria are primarily passed among animals and cause disease in many different vertebrates, including humans. There are four *Brucella* species known to cause disease in humans (*B. abortus*, *B. melitensis*, *B. suis*, *B. canis*). *B. melitensis* is thought to be the most virulent and causes the most severe and acute cases of brucellosis; it is also the most prevalent worldwide. Brucellosis is a CDC Category B Bioterrorism agent/disease.

### What is the occurrence of brucellosis?

In the United States, only 100 to 200 cases occur each year.

### How is brucellosis transmitted?

Ingestion of contaminated milk products from sheep, goats, cows, or camels is the most common way of transmission, as the bacteria can be transmitted to persons who consume unpasteurized milk, cheeses, or ice cream.

Contact with infected animals or animal excretions (e.g., placenta) poses the risk of the bacteria entering wounds in the skin or mucous membranes. Occupational risk includes those who work in slaughterhouses, meat packing facilities, and veterinarians. Hunters may be infected through skin wounds, ingesting undercooked meat, or inhaling the bacteria when cleaning infected animals such as bison, elk, moose, caribou, and wild hogs (feral swine).

Inhalation of *Brucella* organisms can be an occupational hazard for people in laboratories that work with the bacteria and for those working in slaughterhouses and meat-packing facilities.

Direct person-to-person spread of brucellosis is extremely rare. Mothers who are infected may transmit the infection through breastfeeding. Sexual transmission has been rarely reported. Although uncommon, transmission may occur via tissue transplantation or blood transfusions.

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*B. canis* is the species of *Brucella* that can infect dogs. This species has occasionally been transmitted to humans, but most 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. 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 (receiving treatment for cancer, HIV, or transplant) should not handle dogs known to be infected with *B. canis*.

### What are the signs and symptoms of brucellosis?

Brucellosis has an acute or insidious onset with continued, intermittent, or irregular fever of variable duration; headache; weakness; profuse sweating; malaise; fatigue; anorexia; pain in muscles, joints, and/or back; and weight loss.

### What are potential complications of brucellosis?

Some signs and symptoms may persist, recur, or not resolve. These can include recurrent fevers, arthritis, chronic fatigue, neurologic symptoms (in up to 5% of all cases), meningitis; inflammation of the spine (spondylitis); focal organ involvement (endocarditis); swelling of the testicle (orchitis, epididymitis), liver (hepatomegaly), and/or spleen (splenomegaly); or depression. Organ infections can last up to a year or longer if left untreated. Mortality is rare (<2% of all cases) and is usually associated with endocarditis.

### How is brucellosis diagnosed?

The gold standard for patient diagnosis is microbiological isolation of *Brucella* species in samples of blood, bone marrow, or other body tissues or fluids. Blood serum is tested to detect antibodies (*Brucella* total antibody titer by slide agglutination test (SAT)). Any clinical specimen may be tested for *Brucella* nucleic acid (DNA) (example: polymerase chain reaction (PCR), sequencing, nucleic acid amplification test (NAAT)). An acute noncomplicated case is confirmed by at least a fourfold increase of *Brucella* antibody titer on an agglutination assay between paired acute and convalescent sera separated by at least 2 weeks. For chronic, complicated, or neuro-brucellosis cases, serologic assays other than agglutination, such as enzyme-linked immunosorbent assay (ELISA), are recommended. Serologic tests to detect *B. canis* antibodies are not performed routinely by diagnostic laboratories.

### How is brucellosis treated?

Treatment is a combination of doxycycline and rifampicin, or streptomycin, for at least 6 weeks. The streptomycin-containing regimen is generally associated with a lower rate of relapse, although it may be less effective in treating neurobrucellosis, due to low penetration into cerebrospinal fluid and the potential for neurotoxicity. Doxycycline for 6 weeks in combination with gentamicin for 7 days may be an acceptable alternative. Depending on the timing of treatment and severity of illness, recovery may take a few weeks to several months.

### How can brucellosis be prevented?

A vaccine is not available for humans. Do not consume unpasteurized milk, cheese, or ice cream. Hunters should use rubber gloves, goggles, and a gown or apron when handling animals.

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### What are some public health considerations?

- A positive *Brucella* slide agglutination test (SAT) is the same as Microagglutination Test (MAT); it therefore meets the probable case definition and should be reported.
- Document relevant travel and deployment history occurring within the incubation period (5 days to 5 months).
- Document the source of infection, if known.
- Document the circumstances for exposure (e.g., duty exposure, occupational activities, environmental exposures, other high-risk activities).
- Standard notification (routine data submission) is the criterion for cases not temporally or spatially clustered.
- Notification within 24 hours is the criterion for multiple brucellosis cases, temporally or spatially clustered.
- A brucellosis case report form is available from the CDC.  
<https://www.cdc.gov/brucellosis/surveillance/index.html>

### References:

“Brucellosis,” Centers for Disease Control and Prevention (CDC), last reviewed November 2, 2021. <https://www.cdc.gov/brucellosis/>

Defense Health Agency. 2022. *Armed Forces Reportable Medical Events: Guidelines and Case Definitions*.

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