

# *Brucella melitensis*

## Background

The genus *Brucella* consists of slow-growing, very small gram-negative coccobacilli whose natural hosts are mammals. Seven *Brucella* species have been described using epidemiologic and biological characteristics, although at the genetic level all brucellae are closely related. *B. melitensis* (natural host: sheep/goats), *B. suis* (natural host: swine), *B. abortus* (natural host: cattle), *B. canis* (natural host: dogs), and *B. "maris"* (natural host: marine mammals) have caused illness in humans exposed to the organism including laboratory personnel. Hypersensitivity to *Brucella* antigens is a potential but rare hazard to laboratory personnel. Occasional hypersensitivity reactions to *Brucella* antigens occur in workers exposed to experimentally and naturally infected animals or their tissues.

## Agent Criteria

**Infectious Dose:** 10-100 organisms

**Stability:** Susceptible to many disinfectants - 1% sodium hypochlorite, 70% ethanol, iodine/alcohol solutions, glutaraldehyde, formaldehyde. Susceptible to moist heat (121°C for at least 15 min) and dry heat (160-170°C for at least 1 hour). Survives in carcasses and organs - up to 135 days; paper - 32 days; soil - 125 days; blood 4°C - 180 days

*Gram +/-:* Gram negative

### **Shedding patterns (for animal pathogens):**

*Shed all the time:* The organism may be shed in the secretions and excretions of infected animals. May be present in the blood, lymph nodes, reproductive tract, udder and other tissues.

**Incubation Period:** Highly variable; 5- 60 days; occasionally several months. The acute form is <8 weeks from infection to illness onset. The undulant form is <1 year from infection to illness onset. The chronic form is >1 year from infection to illness onset.

**Mortality Rate:** <2% case fatality rate for untreated cases

### **Morbidity Rate:**

*Duration of Illness:* Acute brucellosis may last up to 8 weeks, subacute illness may last for 9 to 52 weeks, and chronic brucellosis may last for years.

*Severity of Illness:* Nonspecific and "flu-like" symptoms including fever, sweats, malaise, anorexia, headache, myalgia, and back pain. In the undulant form (<1 year from illness onset), symptoms include undulant fevers, arthritis, and epididymo-orchitis in males. Neurologic symptoms may occur acutely in up to 5% of cases. In the chronic form (>1 year from onset), symptoms may include chronic fatigue syndrome, depression, and arthritis.

*Duration of Infection:* In the chronic phase the infection can last for years.

*Long term effects after infection:* Variable, including granulomatous hepatitis, peripheral arthritis, spondylitis, anemia, leukopenia, thrombocytopenia, meningitis, uveitis, optic neuritis, papilledema, and endocarditis.

**Allergen (yes/no):** No

**Carcinogenic/mutagenic (yes/no):** No

**Abortogenic (yes/no):** Yes

**Toxin Production:** Yes, similar to enterobacterial endotoxins

**Drug Resistance:** Resistant to penicillins and cephalosporins

**Infection Mitigation Measures:**

*For human pathogens*

*Immunization:* Vaccines not available for use in humans

*Prophylaxis:* Antibiotics, not generally used

*Post Infection Treatment:* Susceptible to tetracyclines and streptomycin or TMP-SMX; therapy usually consists of a combination of doxycycline and streptomycin

*Existence of Diagnostic tests:* Yes (enzyme-linked immunosorbent assay (ELISA))

*For animal pathogens*

*Detection Possible:* Yes

*Culling:* Possibly, depending on region

*Prophylaxis:* No

*Immunization:* Yes

*Post Infection Treatment:* No

**Routes of Infection:**

*Inhalation:* Exposure to aerosols

*Ingestion:* Yes

*Percutaneous:* accidental inoculation

*Contact:* direct skin contact with cultures of infectious specimens from animals; sprays into eyes, nose and mouth

*Vector-Borne:* No

**Natural Routes of Infection:**

*Inhalation:* Yes

*Ingestion:* Ingestion of raw milk or cheese from infected animals

*Percutaneous:* Contact with infected tissues

*Contact:* Contact with infected tissues or discharges

*Vector-Borne:* No

*Sexual Transmission:* Yes

*Vertical Transmission:* Yes

**Communicability:**

*Human to Human:* No evidence of person to person transmission

*Human to Animal:* No evidence

*Animal to Animal:* Yes

*Animal to Human:* Yes

*Multiple Species:* Humans, cattle, swine, goats, sheep, deer, caribou, elk, dogs, coyotes

**Where is it present:** Worldwide, especially in Mediterranean countries of Europe and Africa; Middle East, India, central Asia, Mexico, Central and South America; common in those who eat raw caribou; occurrence often depends on extent of animal Brucellosis; predominantly an occupational disease of those who work with infected animals or their tissues

**Where is it endemic:** Almost all Mediterranean countries, India, China, South Africa, and much of Central America and South America.