



## A Global Perspective on Brucellosis: Understanding the Disease and Diagnosis

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### Introduction

Brucellosis is a significant zoonotic infection caused by the genus *Brucella*, which affects both animals and humans. This manuscript provides a comprehensive overview of brucellosis, focusing on its pathogenesis, clinical manifestations, diagnostic approaches, and treatment strategies. Emphasizing the importance of early detection and appropriate management, this document aims to enhance understanding and improve outcomes for affected individuals. Brucellosis is a systemic disease primarily transmitted from animals to humans through unpasteurized dairy products or direct contact with infected animals. The disease, caused by *Brucella* species, presents with a range of symptoms that can mimic other febrile illnesses, making diagnosis challenging. Effective management requires a combination of antimicrobial therapy and preventive measures to control both human and animal cases.

Brucellosis is caused by several species of the *Brucella* genus, including *Brucella abortus*, *Brucella melitensis*, *Brucella suis*, and *Brucella canis*. The pathogenesis of brucellosis involves the following stages. Humans acquire brucellosis through ingestion of contaminated food, particularly unpasteurized milk and cheese, inhalation of aerosolized particles, or direct contact with infected animals or their secretions. After entering the body, *Brucella* bacteria are phagocytosed by macrophages but can evade destruction and replicate intracellularly. The bacteria disseminate via the lymphatic system and bloodstream, leading to systemic infection. *Brucella* species have evolved mechanisms to evade the host immune response, including inhibition of phagolysosome fusion within macrophages. The disease progresses through the formation of granulomas in various organs, including the liver, spleen, and lymph nodes. This chronic infection can lead to persistent symptoms and complications if untreated.

### Description

#### Clinical presentation

Brucellosis can present with a wide range of symptoms, which can vary depending on the strain of *Brucella* and the host's immune response.

**Acute brucellosis:** Fever is the most characteristic symptom, often undulant (rising and falling) in nature. Fever can be intermittent or persistent and may be accompanied by chills and sweating. Fatigue, weakness, and loss of appetite are common. Arthralgia (joint pain) and myalgia (muscle pain) are frequent complaints.

**Chronic brucellosis:** Relapsing fever chronic cases may experience recurring fever episodes. Granulomatous lesions can affect the liver, spleen, and bone marrow, leading to hepatomegaly, splenomegaly, and anemia. May include osteoarticular manifestations (e.g., sacroiliitis), endocarditis, and neurological involvement. Prostatitis, epididymitis, or infertility in men. In women, it may cause endometritis or abortion. Chronic infection can lead to osteomyelitis or arthritis. Diagnosing brucellosis involves a combination of clinical evaluation, microbiological tests, and serological assays. Assessing exposure risk, including contact with livestock or consumption of unpasteurized dairy products, and evaluating symptoms. The gold standard for diagnosis, though *Brucella* species are fastidious and may take several weeks to grow. Often used in chronic cases or when blood cultures are negative. ELISA and Agglutination Tests detects antibodies against *Brucella* species. The standard tests include the Rose Bengal test and the Wright's agglutination test. Detection of a rise in antibody levels between acute and convalescent phases of the illness supports the diagnosis. PCR (Polymerase Chain Reaction) Offers rapid and specific detection of *Brucella* DNA in clinical specimens, including blood and tissue samples. Effective management of brucellosis requires a combination of antibiotic therapy and supportive care.

**Antibiotic therapy:** A combination of doxycycline and rifampin for six weeks is recommended. This regimen has shown to be effective for both acute and chronic cases. In cases of drug intolerance or resistance, other combinations such as doxycycline with streptomycin or gentamicin may be used. Managing symptoms such as fever and pain with analgesics and antipyretics. Regular follow-up is essential to monitor response to therapy and detect any potential relapse or complications.

Preventing brucellosis involves both public health measures and personal precautions. Vaccination of livestock, particularly cattle and sheep, can reduce the incidence of brucellosis in animals and, consequently, human cases. Ensuring pasteurization of dairy products and enforcing regulations on meat inspection can prevent transmission through contaminated food. Consuming only pasteurized milk and dairy products. Using personal protective equipment when handling animals or animal products in high-risk settings.

### Conclusion

Brucellosis remains a challenging zoonotic infection with significant health impacts. Early diagnosis and appropriate treatment are crucial for effective management and preventing complications. Continued efforts in vaccination, public health interventions, and education about food safety and occupational risks are essential for controlling the spread of brucellosis. Enhanced surveillance and research into novel diagnostic and therapeutic approaches will further improve outcomes and reduce the burden of this disease.

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