Brucellosis
by Meredith Johnson

Brucellosis; Etiological agent- *Brucella abortus*, *Brucella melitensis* and *Brucella suis* (2).

**Transmission:**
Through one of three ways:
1) Inhalation of the *Brucella* bacteria
2) Entering through a skin wound or mucus membrane
3) Contact with infected animals, usually through hunting of bison, elk, caribou, moose, and feral hogs.

**Reservoirs:**
Unpasteurized/raw dairy products or undercooked meat, through the air, or close contact with infected animals secretions (1).

**General Characteristics:**
Gram-negative, nonmotile, nonspore-forming, coccobacillus. The organism is oxidase, catalase, nitrate reductase, and urease positive (7). It is distinguishable by species classification of the carrier, *Brucella abortus* is found in cattle, *Brucella melitensis* is found in sheep with the highest pathogenicity; *Brucella suis* is found in pigs. (4). Brucellosis can be identified by isolation of the *Brucella* species from the blood or other specimen or an ELISA IgG test or Coombs IgG test for detection of non-agglutinating antibodies. A positive Rose Bengal test (RBT) or standard agglutination test (SAT) are other methods in which brucellosis can be identified, but they are generally not as specific as other tests. The PCR and lateral flow assay tests have yet to be accredited (5).

**Signs and Symptoms:**
After an incubation period of two to three weeks, the onset of symptoms develop slowly over a period of weeks to months from the time of infection. Clinical symptoms are highly variable and nonspecific, but most are characterized by inconstant fevers of unknown origin, sweats, fatigue, malaise, anorexia, weight loss, headache, arthralgia and back pain. Patients usually feel better in the morning, with symptoms worsening with the progression of the day. Other potential complications include miscarriage, depression, sleep disturbance, pallor, lymphadenopathy, osteoarthritis, and endocarditis (6).

**Virulence Mechanisms:**
*Brucella* cells have developed specific strategies to escape recognition by the innate immune system and influence antigen presentation mediated by cells. Its virulence is dependent upon immune evasion, intercellular survival, and replication. It has changed the innate and adaptive function of the human immune system leading to T-cell evasion and chronic infection. *Brucella* periplasmic cyclic B-1 2-glucan necessitates transportation in to the periplasmic space to exert its action as a virulence factor, but it is not required for virulence. Another important feature of *Brucella* bacteria cells are their persistence to colonize cells of the reticuloendothelial system and incubate within cells, allowing them to survive the reactive oxygen intermediate and the nitric oxide in the host phagocytes (7). Following this, “they activate bacterial genes in response to the acidic phagosome environment, prevent fusion of phagolysosomes by remodeling the intercellular compartment, and subsequently replicate intracellularly” (7).
Control/Treatment:
In order for treatment to begin, a diagnosis must be made by a medical professional. Once the diagnosis is made, the medical professional can prescribe antibiotics. Generally, antibiotics such as tetracyclines, rifampicin, and the aminoglycosides, streptomycin and gentamicin, are recommended in combination against *Brucella* bacteria for a minimum of 6-8 weeks (2). Depending on when treatment begins after infection and severity of illness, recovery may take several weeks to months. Although *Brucella* vaccines exist, the World Health Organization (WHO) counters that “there is not convincing evidence of benefit from administering vaccines or antigen preparations, nor for the use of immune system modulators, such as levamisole, in the treatment of human brucellosis” (6).

Current Information:
Brucellosis can be found worldwide, and is most prevalent in countries with ineffective public health and domestic animal programs. Areas currently considered high risk by the Centers for Disease Control and Prevention (CDC) are the Mediterranean Basin (Portugal, Spain, Southern France, Italy, Greece, Turkey, North America); Mexico, South and Central America; Eastern Europe; Asia; Africa; the Caribbean; and the Middle East (2). There are about 100-200 cases per year of brucellosis in the United States making it a rare infection (3). Death from *Brucella* infection is uncommon worldwide, occurring in 2% or less of all cases (2). Several investigators at the University of Wyoming are looking at different vaccines for animals which has shown promising results. These efforts could help prevent disease transmission from infected animals to humans, and aid in protection against the devastating effects the disease can cause both animals and humans (8).

Works Cited:


