Canine Brucellosis: 
Brucella canis 

Contagious Abortion, 
Undulant Fever

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Importance
Canine brucellosis, caused by Brucella canis, is an important cause of reproductive failure, particularly in kennels. B. abortus causes abortions, stillbirths, epididymitis, orchitis and sperm abnormalities in dogs. Canine brucellosis can end the reproductive career of a breeding animal. B. canis is zoonotic, although disease appears to be rare in humans.

Etiology
In dogs, brucellosis is mainly caused by Brucella canis, a Gram-negative coccobacillus or short rod. This organism is a facultative intracellular pathogen. Other Brucella species occasionally associated with disease in dogs include Brucella abortus, B. melitensis and B. suis. (For information on these organisms, see the factsheets titled “Bovine Brucellosis,” “Ovine and Caprine Brucellosis,” and “Porcine Brucellosis” respectively.) Genetic and immunologic evidence suggests that all members of the genus Brucella are closely related, and some microbiologists have proposed that this genus be reclassified into a single species (B. melitensis), which contains many biovars. This proposal is controversial, and both taxonomic systems are currently in use. The multiple species nomenclature is used in this factsheet.

Species Affected
Dogs are the only species known to be affected by B. canis; however, antibodies to this organism have been found in other carnivores. Experimental infections can be established in domesticated livestock and chimpanzees; however, these species are considered highly resistant to natural exposure. B. canis is zoonotic, but human infections seem to be uncommon.

Geographic Distribution
B. canis has been reported from the United States (particularly the southern states), Canada, Central and South America (including Mexico) some European countries, Tunisia, Nigeria, Madagascar, Malaysia, India, Korea, Japan and China. B. canis is probably found throughout most of the world; however, New Zealand and Australia appear to be free of this organism.

Transmission
B. canis occurs in the fetus, placenta, fetal fluids and vaginal discharge after an abortion or stillbirth. This organism can be found in vaginal discharges for 4 to 6 weeks after an abortion. It is also shed in normal vaginal secretions, particularly during estrus, as well as in milk. High concentrations of B. canis are found in semen for up to two months after infection, and intermittent shedding of smaller quantities can occur for years. B. canis is also found in urine, and low concentrations of bacteria may be excreted in saliva, nasal and ocular secretions, and feces.

In dogs, B. canis is mainly transmitted by contact with the fetus and fetal membranes after abortions/stillbirths, or by venereal transmission. This organism primarily enters the body by ingestion and through the genital, oronasal and conjunctival mucosa, but transmission through broken skin may also be possible. In utero infections occur. Nursing puppies can be infected from milk, but the importance of this route is controversial. Other potential sources of infection include blood transfusions and contaminated syringes. Dogs often become chronically infected with B. canis and can shed this organism for prolonged periods. Although some dogs clear the infection after a year, others remain bacteremic for five years and possibly longer.

B. canis can also be spread on fomites. In conditions of high humidity, low temperatures, and no sunlight, Brucella spp. can remain viable for several months in water, aborted fetuses, feces, equipment and clothing. Brucella species can withstand drying, particularly when organic material is present, and can survive in dust and soil. Survival is longer when the temperature is low, particularly when it is below freezing.

Humans usually become infected with Brucella spp. by ingesting organisms or by the contamination of mucous membranes and abraded skin. Infection with B. canis seems to require close contact with infected dogs or contact with bacterial cultures.
**Incubation Period**

Dogs usually become bacteremic two to three weeks after infection. The period between infection and reproductive signs is variable; abortions are most common at approximately 7 to 9 weeks of gestation. Early embryonic deaths 2 to 3 weeks after venereal transmission have also been reported.

**Clinical Signs**

*Brucella canis* can cause abortions and stillbirths in pregnant dogs. Most abortions occur late, particularly during the seventh to the ninth week of gestation. Abortions are usually followed by a mucoid, serosanguinous or gray-green vaginal discharge that persists for up to six weeks. Early embryonic deaths and resorption have been reported a few weeks after mating, and may be mistaken for failure to conceive. Some pups are born live but weak; these pups often die soon after birth. Other congenitally infected pups can be born normal and later develop brucellosis. Clinical signs occur during subsequent pregnancies in some dogs, but not in others.

The sperm may have morphological abnormalities and reduced viability in some infected males. Epididymitis, scrotal edema and orchitis may also be apparent. Scrotal dermatitis can occur due to self-trauma. Unilateral or bilateral testicular atrophy can be seen in chronic infections, and some males become infertile.

Lymphadenitis is common in infected dogs. The retropharyngeal lymph nodes may enlarge after oral infection, and the superficial inguinal and external iliac nodes after vaginal infection. Generalized lymphadenitis is also common. Other symptoms that are occasionally reported include lethargy or fatigue, exercise intolerance, decreased appetite, weight loss and behavioral abnormalities (loss of alertness, poor performance of tasks); however, most affected dogs do not appear seriously ill. Occasionally, diskospondylitis of the thoracic and/or lumbar vertebrae can cause stiffness, lameness or back pain. Uveitis, endophthalmitis, polygranulomatous dermatitis, endocarditis and meningoencephalitis have also been reported. Fever is rare. Many infected dogs remain asymptomatic.

Dogs with brucellosis may recover spontaneously, beginning a year after infection, but recovery is more common after 2 to 3 years, and some dogs remain chronically infected for at least five years. Deaths are rare except in the fetus or newborn.

**Post Mortem Lesions**

The lymph nodes are often enlarged in affected animals. The retropharyngeal and inguinal lymph nodes are often involved, but generalized lymphadenitis also occurs. The spleen is frequently enlarged, and may be firm and nodular. Hepatomegaly may also be seen. Scrotal edema, scrotal dermatitis, epididymitis, orchitis, prostatitis, testicular atrophy and fibrosis occur in some infected males, and metritis and vaginal discharge may be seen in females. Less commonly reported lesions include diskospondylitis, meningitis, focal non-suppurative encephalitis, osteomyelitis, uveitis, and abscesses in various internal organs.

Aborted puppies are often partially autolysed and have evidence of generalized bacterial infection. Fetal lesions can include subcutaneous edema, subcutaneous congestion and hemorrhages in the abdominal region, serosanguinous peritoneal fluid, and degenerative lesions in the liver, spleen, kidneys and intestines.

**Morbidity and Mortality**

All breeds of dogs are susceptible to canine brucellosis. The prevalence of infection is unknown. A seroprevalence rate of 30% has been reported in Central and South America. In the southern U.S., approximately 6% of dogs, overall, have antibodies to *Brucella canis*. Infections are particularly common in stray and feral dogs, and less common in pets.

*Brucella canis* spreads rapidly in confined populations, particularly during breeding or when abortions occur. Although death is rare, except in the fetus and neonate, significant reproductive losses can be seen, particularly in breeding kennels. Up to 75% fewer puppies may be weaned from affected kennels.

**Diagnosis**

**Clinical**

Canine brucellosis should be considered when abortions and stillbirths are seen, particularly late in gestation, or when male dogs develop epididymitis and testicular atrophy. Some infected dogs are asymptomatic or have only nonspecific signs such as lymphadenitis.

**Differential diagnosis**


**Laboratory tests**

Serology can be used for a presumptive diagnosis. Serological tests for *Brucella canis* include rapid slide agglutination (card or RSAT) tests, tube agglutination, an indirect fluorescent antibody (IFA) test, agar gel immunodiffusion and enzyme-linked immunosorbent assays (ELISA). Other tests such as complement fixation and counter-immunoelectrophoresis are used mainly in research. Titers vary between individuals and with the detection method. Cross-reactions between *Brucella canis* and other Gram-negative bacteria can occur in some tests, particularly agglutination tests. Nonspecific agglutination reactions also occur in some dogs.

A definitive diagnosis can be made if *Brucella canis* is cultured from an animal. *Brucella* spp. can be isolated on...
Brucella canis

Brucella canis is zoonotic, but the virulence of this organism for humans may be low. Approximately 30 cases have been reported worldwide since the 1960s. However, B. canis infections can be difficult to diagnose in humans and may be underreported. Seroprevalence rates reported in humans include 13% in a group of hospital patients in Mexico, 0.3% in Germany, 0.4% in US military populations, 0.6% in Florida residents, and 67.8% in Oklahoma residents. Human infections can occur after exposure to bacterial cultures in the laboratory or close contact with dogs, particular after an abortion. A laboratory worker exposed to the less virulent M. strain of B. canis, which is used as an antigen for serological testing, developed symptoms similar to those caused by wild-type strains of Brucella.

B. canis infections in humans resemble brucellosis caused by other Brucella species. Some people infected with Brucella remain asymptomatic. In symptomatic cases, brucellosis is extremely variable and the clinical signs may appear insidiously or abruptly. Typically, this disease begins as an acute febrile illness with nonspecific flu-like signs such as fever, headache, malaise, back pain, myalgia and generalized aches. Drenching sweats can occur, particularly at night. Oral lesions were reported in a child concurrently infected with B. canis and cytomegalovirus, and resolved with antibiotic treatment for brucellosis. Another patient with a B. canis infection had fever of unknown origin. Some patients with brucellosis recover spontaneously, while others develop persistent symptoms that typically wax and wane. Occasionally seen complications include arthritis, spondylitis, chronic fatigue, and epididymo-orchitis. Neurologic signs (including personality changes, meningitis, uveitis and optic neuritis), anemia, internal abscesses, nephritis, endocarditis and dermatitis can also occur. Other organs and tissues can also be affected, resulting in a wide variety of syndromes. Treatment is with antibiotics; however, relapses can be seen months after the initial symptoms, even in successfully treated cases. The mortality rate is low; in untreated persons, estimates of the case fatality rate vary from less than 2%
to 5%. Deaths are usually caused by endocarditis or meningitis.

**Internet Resources**


**References**


*Link defunct as of 2007