Canine Brucellosis: Facts for Practicing Veterinarians

Canine brucellosis is an infectious disease caused by the bacteria *Brucella canis*, a gram-negative, non-motile aerobic intracellular coccobacillus. There are other species of *Brucella* that affect different animals, and a few of these can also infect dogs, but *B. canis* is the most common *Brucella* species found in infected dogs. *B. canis* is a significant cause of reproductive failure in dogs. Canine brucellosis is a public health concern, as it is a zoonotic disease. Although documented cases of canine brucellosis infection in people are rare, the disease is most likely under-diagnosed and under-reported, due to a lack of effective tests for people, and the non-specific presentation of the disease. Veterinarians should be aware of the zoonotic potential and public health risks associated with this disease, and they should educate their clients about the disease.

Canine brucellosis is a reportable disease in New Jersey. Veterinarians who have diagnosed a dog with *B. canis* infection are responsible for reporting this to their local health department.

Clinical Signs

The most common clinical signs associated with canine brucellosis are late-term abortion, stillborn puppies, infertility, lethargy, and lymphadenopathy. Live puppies may be born to an infected bitch, but they may die within a few hours or days. Male dogs may have enlarged testicles and scrotal edema. Advanced cases may present with testicular atrophy. Another manifestation of canine brucellosis is discospondylitis (with associated anorexia, weight loss, pain, lameness, ataxia, and muscle weakness). The incidence of discospondylitis is higher in male than female dogs. Ocular signs include uveitis, corneal edema, and optic neuritis.

Transmission

B. canis organisms are shed in urine, vaginal discharge, semen, aborted material (this contains the highest concentration of organisms), milk, nasal secretions, and saliva. Transmission usually occurs via ingestion of contaminated materials or when mucous membranes come in contact with vaginal discharge from an infected bitch during mating. It may also be transmitted to the female via infected semen. Puppies can become infected in utero or during nursing.

Incubation Period

The incubation period in people is typically 2-4 weeks, but can be as short as 5 days and as long as 6 months. In dogs, bacteremia generally begins 1-4 weeks after infection. The period between infection and reproductive losses is variable. Abortions usually occur in the last trimester of gestation, and early embryonic deaths have occurred a few weeks after venereal transmission. The incubation period for epididymitis is usually 5 or more weeks.

Diagnostic Testing

There are many tests available for diagnosing *B. canis* in dogs. A comparison of diagnostic tests available can be found in the following USDA document: Best Practices for *Brucella canis* Prevention and Control in Dog Breeding Facilities:
(https://www.aphis.usda.gov/animal_welfare/downloads/brucella_canis_prevention.pdf)

Testing usually involves performing a screening test (serology) first, with a confirmatory test performed on all positives. Screening tests are best for detecting early infections, but serologic tests may be negative for the first 2-4 weeks after infection. The Canine Brucella 2 mercapto-ethanol (ME) Slide Agglutination test is commonly used for screening. This is an antibody test, performed on serum. False-positive results are common because of cross-reaction with antibodies to other bacteria. A test commonly used for confirmation of a positive ME Slide Agglutination test is the Agar Gel Immunodiffusion test (AGID II), which uses cytoplasmic antigens and is highly specific for detecting Brucella antibodies. Cultures can also be used to confirm infection. Culture is considered the gold standard test for *B. canis*. Cultures can be performed on many tissues including blood, vaginal discharge, and semen. The best time to perform a culture is 2-4 weeks after infection. Bacteremia typically persists for months, but it may be intermittent, so serial blood cultures should be performed if the initial culture is negative. ***Brucella* species are highly infectious when being cultured, so in order to protect laboratory personnel, the specimen should be clearly labelled as a Brucella suspect**. Cultures are NOT recommended if the dog has been treated with antibiotics.

We recommend calling the laboratory ahead of time for advice on selecting the proper test, as well as instructions on proper specimen handling and packaging.

Zoonotic Potential

People can become infected via contact with fluids and tissues from infected dogs. People appear to be relatively resistant to infection with *B. canis* compared to other *Brucella* species, and the overall rate of infection in people is low; however, people can and do get infected and may become ill. It is believed by many experts that there are cases of human infections that go undetected due to a lack of diagnostic capabilities for human infections. The exact level of risk to humans is currently uncertain.

The most common signs observed with human infection include fever, chills, lethargy, headache, weakness, muscle aches, and lymph node enlargement. In more severe infections, joints, bones, or heart valves may be affected. Signs may appear anywhere from 3 weeks up to several months after infection. People who may have been exposed to *B. canis* from their dog should consult with their physician, especially if they are showing clinical signs compatible with brucellosis. It is important to let their physician know about the canine brucellosis exposure. Human brucellosis is an immediately reportable disease in New Jersey. Upon suspicion (prior to human testing), clinicians are required to notify the local health department where the patient resides. Testing in humans suspected to have *B. canis* infection should be performed by culture, since current human antibody tests for brucellosis cannot detect antibodies to *B. canis*. In these situations, clinicians are encouraged to contact the local health department or NJDOH at 609-826-4872 to request *B. canis* testing at public health laboratories.

Performing a culture for *B. canis* poses an exposure risk to laboratory personnel. Clinicians ordering cultures commercially should notify the laboratory in advance so that appropriate precautions can be taken (https://www.cdc.gov/brucellosis/laboratories/index.html).

Children, pregnant women, immunosuppressed individuals, and those with artificial heart valves may be at increased risk of infection.

Treatment

Brucellosis is considered a lifelong infection in dogs. Treatment of infected animals consists of surgical sterilization and long-term antimicrobial drugs. Treatment usually consists of a combination of antibiotics. Dogs may continue to shed the organism intermittently even after long-term antibiotic use. Even when treatment appears to be successful, the organism may still be present in tissues, such as the prostate, uterus, lymph nodes, or spleen. Euthanasia of infected animals is recommended in kennels, and should also be considered in pets, since treatment is often expensive and unsuccessful.

Prevention

There is no vaccine available to prevent canine brucellosis in dogs or in people. Prevention consists of yearly testing of all breeding dogs, testing all dogs introduced for breeding, only breeding non-infected dogs, adhering to strict cleaning and disinfecting protocols, using personal protective equipment (including gloves and mask) when assisting whelping dogs, and requesting testing before adopting, or by purchasing dogs from reputable breeders only.

Prevention of Further Spread of Disease after Pet is Diagnosed

Humane euthanasia of infected dogs is often recommended to prevent the spread of this disease. When owners are unwilling to euthanize infected pet dogs, they need to be aware of the ongoing potential risk that these dogs carry for infecting people, other dogs, and other susceptible animal species, and the measures they will need to take to prevent further transmission to people and other dogs. Owners should be encouraged to consult with their physician if they are considering keeping the pet, especially if there are young children, pregnant women, or immunocompromised individuals in the household.

The pet should be neutered, in an effort to decrease the shedding of the organism via reproductive secretions, although neutering has not been proven to decrease shedding. The dog should be treated with proper antibiotics, and re-tested to determine if the pet is still shedding the organism. It is recommended to periodically test infected animals to monitor their disease. Testing may be done as often as every 3 months to monitor antibody levels. Remember, shedding is intermittent, so even with frequent testing, shedding periods may be missed. Infected dogs should never be bred. Good hygiene should be practiced, including wearing gloves when cleaning up pet waste and washing hands thoroughly afterward. Contaminated clothing and dog bedding should be laundered frequently. Contaminated surfaces should be disinfected. *B. canis* is short-lived outside of the body. It is readily inactivated by common disinfectants and sunlight. It is, however, stable in the environment in the presence of organic debris (feces, dirt, bedding, or debris) for up to 2 months. It can withstand freezing and can survive in water, dust, and soil. **The pet should not be taken to public areas such as parks, beaches, playgrounds, pet stores, etc. Owners should not allow the dog to mouth, or "kiss" people.** Owners should be cautioned against allowing the infected pet to have contact with children, pregnant

women, and immunocompromised people, as these individuals may be more susceptible to contracting the disease.

Veterinarian's Responsibility

Veterinarians should report all cases of *B. canis* infections to their local health department. A directory of local health departments is available at localhealth.nj.gov.

The NJDOH has drafted a template letter for veterinarians and/or health officers to give to owners of infected dogs, outlining the owner's responsibility. (The letter is attached at end of this document, and should be edited to include owner's information.)

Veterinarians should provide the owner of an infected dog with NJ Department of Health prevention and control recommendations:

- Dogs infected with canine brucellosis should be spayed/neutered in an effort to reduce the chance of transmission of disease.
- Do not breed dogs infected with canine brucellosis.
- Avoid direct (bare skin) or mucus membrane contact with bodily fluids (e.g., urine, feces, vomit, saliva, blood, wound drainage, vaginal secretions) from infected dogs. If contact does occur, wash with soap and warm water, and consult with your primary care physician.
- Always wear disposable gloves when cleaning up bodily fluids (e.g., urine, vomit, and feces). *B. canis* is stable in the environment in the presence of organic debris for up to two months. *B. canis* can withstand drying in the presence of organic debris, can withstand freezing, and can survive in water, dust and soil. A combination of organic debris, high humidity, low temperatures and little or no sunlight favors survival of the organism. Cleaning and disinfection requires scrubbing contaminated surfaces with a degreasing cleanser that does not leave a residual film, then thoroughly rinsing the contaminated surfaces before applying an effective disinfectant that is mixed in accordance with manufacturer's label instructions for disinfection of animal contact surfaces. The disinfectant is required to remain wet on the surface for the required contact time in order to be effective against the target organism.
- Avoid taking infected pet to public areas where he/she would have significant contact with other dogs (e.g., dog parks, dog-grooming facilities, doggie day care, beaches, etc.)
- Do not allow young children, pregnant women, or individuals with compromised immune systems or artificial heart valves to have direct contact with the infected pet or his/her bodily fluids.
- Always alert veterinary clinics of the dog's *B. canis* infection prior to taking him/her for veterinary care, so that the staff may take precautions to protect themselves from becoming infected.
- Follow your veterinarian's advice about periodic testing to monitor the course of disease in your dog.

- Do not sell or give your dog away without first notifying the new owner about the *B. canis* diagnosis and providing these disease prevention guidelines to the new owner.
- If you are concerned about your health, see your health care provider and inform them that your dog has canine brucellosis. Because of the ongoing risk of canine brucellosis transmission to humans and other dogs, humane euthanasia of your dog is an acceptable alternative if you are not able to comply with the prevention and control measures outlined above. We understand that this is a difficult situation for you because your dog is a loved family member. If you have any questions or concerns about fulfilling these responsibilities, please call your local health department.

Resources for Veterinarians

Best Practices for *Brucella canis* Prevention and Control in Dog Breeding Facilities. USDA. 2015. (www.aphis.usda.gov/animal_welfare/downloads/brucella_canis_prevention.pdf)

Hensel, M. E., Negron, M., & Arenas-Gamboa, A. M. (2018). Brucellosis in Dogs and Public Health Risk. *Emerging Infectious Diseases*, *24*(8), 1401-1406. https://dx.doi.org/10.3201/eid2408.171171.

Public Health Implications of *Brucella canis* Infections in Humans. National association of State Public Health Veterinarians, March 2012. (http://www.nasphv.org/Documents/BrucellaCanisInHumans.pdf)

Brucellosis: *Brucella canis* (Contagious Abortion, Undulant Fever). May 2018. (http://www.cfsph.iastate.edu/Factsheets/pdfs/brucellosis_canis.pdf)

Cosford K. L. (2018). *Brucella canis:* An update on research and clinical management. *The Canadian veterinary journal = La revue veterinaire canadienne*, *59*(1), 74–81. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5731389/

Dear [NAME OF] Family,

You are receiving this letter because your dog, [DOG's NAME] was diagnosed with canine brucellosis. Canine brucellosis is a zoonotic disease caused by the bacteria, *Brucella canis* (*B. canis*). A zoonotic disease is a disease that can be spread from animals to humans. The most common way people become infected is through direct contact between an infected dog's bodily fluids (e.g., urine, feces, blood, wound drainage, saliva, semen, and vaginal secretions) and a person's mucous membranes, or a break in the person's skin. Individuals at highest risk of becoming severely ill when infected with canine brucellosis are people with weakened immune systems, young children, pregnant women, or those with artificial heart valves.

You should follow up with your veterinarian regarding next steps for your dog. No treatment, including antibiotics, is certain to eliminate *B. canis* infection; dogs can appear healthy and still shed *B. canis* in their bodily fluids intermittently for many months or years.

Your responsibilities for minimizing future human or dog exposures to canine brucellosis:

- Dogs infected with canine brucellosis should be spayed/neutered in an effort to reduce the chance of transmission of disease.
- Do not breed dogs infected with canine brucellosis.
- Avoid direct (bare skin) or mucus membrane contact with bodily fluids (e.g., urine, feces, vomit, saliva, blood, wound drainage, vaginal secretions). If contact does occur, wash with soap and warm water, and consult with your primary care physician.
- Always wear disposable gloves when cleaning up bodily fluids (e.g., urine, vomit, and feces). *B. canis* is stable in the environment in the presence of organic debris for up to two months. *B. canis* can withstand drying in the presence of organic debris, can withstand freezing, and can survive in water, dust and soil. The combination of organic debris, high humidity, low temperatures and little or no sunlight favors survival of the organism. Cleaning and disinfection requires scrubbing contaminated surfaces with a degreasing cleanser that does not leave a residual film, then thoroughly rinsing the contaminated surfaces before applying an effective disinfectant that is mixed in accordance with manufacturer's label instructions for disinfection of animal contact surfaces. The disinfectant is required to remain wet on the surface for the required contact time in order to be effective against the target organism.
- Avoid taking dogs infected with canine brucellosis to public areas where he/she would have significant contact with other dogs (e.g., dog parks, doggie day care, beaches, etc.)
- Do not allow young children, pregnant women, or individuals with compromised immune systems or artificial heart valves to have direct contact with the infected pet or his/her bodily fluids.
- Always alert veterinary clinics of *B. canis* infection prior to taking him/her for veterinary care, so that the staff may take precautions to protect themselves from becoming infected.
- Follow your veterinarian's advice about periodic testing to monitor the course of disease in your dog.
- Do not sell or give your dog away without first notifying the new owner about the *B. canis* diagnosis and providing these disease prevention guidelines to the new owner.
- If you are concerned about your health, see your health care provider and inform them that your dog has canine brucellosis. Because of the ongoing risk of canine brucellosis transmission to humans and other dogs, humane euthanasia of your dog is an acceptable alternative if you are

not able to comply with the prevention and control measures outlined above. We understand that this is a difficult situation for you because your dog is a loved family member. If you have any questions or concerns about fulfilling these responsibilities, please call your local health department.

- For more information, please see the *Canine Brucellosis: Facts for Dog Owners* at: https://www.nj.gov/health/cd/reporting/when/dcard.shtml

Sincerely,

Veterinarian/Health Officer