Canine Brucellosis: what you need to know

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Abstract: This will explain what brucellosis is, who is at risk, how it is transmitted, symptoms, testing options, and treatment options. It will also go over how to help prevent an outbreak.

Keywords: Brucellosis, Canine Brucellosis, *Brucella canis, B. canis,* Rapid Slide Agglutination Test, Agar-gel Immunodiffusion

What is Brucellosis?

- It is an infectious disease caused by a type of intracellular, gram-negative bacteria called Brucella.

Brucella Species and Host

- *B. abortus*- cattle; *B. melitensis*- Goats, sheep, camels; *B. suis*- Pigs; *B. canis*- Dogs; *B. ovis*- Sheep, goats; *B. neotomae*- Wood Rats; *B. pinnipediae*- Pinnipeds (seals, sea lions, walruses); *B. ceti*- Cetaceans (Dolphins, porpoises, whales); *B. microti*- Common Vole

Other Animals Infected

- Deer, bison, horses, moose, caribou, hares, chickens, desert rats, **HUMANS**

Brucella Species Zoonotic to Humans

- *B. abortus*- cattle; *B. melitensis*- Goats, sheep, camels; *B. suis*- Pigs; *B. canis*- Dogs; *B. pinnipediae*- Pinnipeds (seals, sea lions, walruses); *B. ceti*- Cetaceans (Dolphins, porpoises, whales)

-Deer, bison, horses, moose, caribou, hares, chickens, and desert rats, humans

Most common way humans contract Brucella

- Drinking unpasteurized milk and eating unpasteurized cheese

People Most at Risk

- Meatpackers, Veterinary professionals, Hunters, Farmers, Animal Producers, Microbiology Laboratory Technicians

Canine Brucellosis

Brucella canis

B. canis

- Host is Canines
- Not been found in wolves or coyotes
  - Mixed information

Which Canines are at Risk

- Intact females, intact males, spayed females, neutered males, all ages, all breeds

High Risk Canines

- Breeding dogs, dogs who are housed in kennels (multiple dogs), dogs who travel

How is it Transmitted

- Direct contact with **ALL BODILY FLUIDS**
  - Semen, vaginal discharge, aborted or birthing tissue, milk, saliva, urine, feces
- It can be aerosolized while cleaning
- Fomite- shoes, kennels, bowls

Symptoms

- Females
  - Abortion (45-55 days), early embryonic death (perceived conception failure), endometritis, prolonged vaginal discharge
- Puppies
  - Born dead, born alive and soon die, some puppies live to become adults
- Males
  - Testicular enlargement (one or both), testicular atrophy, epididymitis, scrotal dermatitis, Infertility, sperm morphology abnormalities (by week 20: 90% are abnormal)
- Both Female and Male
  - Lethargy, lymphadenitis, ocular disease (uveitis), vertebral pain (discospondylitis), loss of libido, asymptomatic (**NO SYMPTOMS**)

Testing Options

- Screening vs. Confirmation
- *All of the tests have limitations and should be used in conjunction with one another. Understanding each test's limits is critical in the interpretation of the results.
- Sensitivity vs. Specificity
  - Sensitive- Trust Negatives
  - Specific- Trust Positives
- Rapid Slide Agglutination Test (RSAT)
  - Antibody test
  - 1-4 weeks post infection (RSAT)

- High sensitivity
- Negative results (95-99% accurate)
- Few false negatives
  - On antibiotics
  - Too early in exposure
- False positives possible
- In-house or mail out
- Good screening test

- Rapid Slide Agglutination Test Mercaptoethanol (RSAT-2ME)
  - Run as a secondary test if RSAT is positive
  - Antibody test
  - 3-4 weeks post infection
  - High sensitivity, but lower then RSAT
  - Few false negatives
    - On antibiotics
    - Too early in exposure
  - False positives possible
  - In-house or mail out
  - Good screening test
  - Testing

- Tube Agglutination Test (TAT)
  - Antibody test
  - Usually 2-6 weeks post infection

- High sensitivity, but lower then RSAT
- False positives possible
- Titers
- 1:50 may indicate early infection
  - 1:50 to 1:100 suspected infection
  - ≥ 1:200 highly presumptive of active infection
- Mail out
- Good screening test
- Testing

- Mercaptoethanol Tube Agglutination Test (ME-TAT)
  - Antibody test
  - Usually 2-8 weeks post infection
  - Longer testing time
  - False positives possible
  - Titers
    - 1:50 may indicate early infection
    - 1:50 to 1:100 suspected infection
    - ≥ 1:200 highly presumptive of active infection
  - Mail out
  - Good screening test

- Indirect Fluorescent Antibody (IFA)
  - Antibody test
  - Earliest detection is unknown

- False positives possible
- Lower sensitivity and specificity then RSAT and TAT
- Mail out
- Screening test

- Agar-gel Immunodiffusion (AGID) Internal cytoplasmic protein antigen
  - Antibody test
  - Usually 8-12 weeks post infection
  - Highly specific
  - False negative possible
  - Mail out
  - Good confirmatory test
  - Not to be confused with AGID cell wall antigen

- Blood or Tissue Culture
  - Organism Detection
  - Bacteremia detectable 2-4 week post infection
    - Intermittent bacteremia
  - Highly specific
  - False negative possible
  - Mail out
  - Good confirmatory test
  - Poor screening test

- PCR

- Organism DNA Detection
- Detectable at 1.5 CFU/ML
- Highly specific
    - More sensitive than culture
    - Sensitivity and specificity may vary between labs
    - Caution should be used when interpreting the results
- False negative possible
- Mail out
- Poor screening test

Who to Screen and When

- Female dogs-
    - every 6 months if breeding
- Male dogs-
    - Twice a year if breeding in a closed colony, cool shipping semen or breeding outside bitches- within one month, freezing semen- we will do it every time
- All nonbreeding dogs in the kennel-
    - Once a year
- Any new dog
    - Quarantine, test and retest in one month
- Any dog having any symptoms

Reportable?

- State dependent for animals
- All 57 states and territories for humans

- Believed to be under reported

Treatment

- THERE IS **NO CURE**; **Euthanasia (RECOMMENDED FOR ALL POSITIVE DOGS)**
- Kennel / Multiple dogs
  - Rehoming is **NOT** recommended
  - Test all dogs, euthanize all positive dogs, retest all dogs in 4 weeks, euthanize all positive dogs, repeat every 4 weeks until you get negatives on all dogs for 2 consecutive tests.
  - Most people cull the entire kennel when there is an outbreak.
- Single Pet
  - Spay or Neuter
  - Antibiotics
    - Still sheds; can test negative, even though it is positive
  - Lifestyle Change
  - People entering the house need to be informed
  - Rehoming is **NOT** recommended

Prevention

- No canine vaccine in the United States
  - Vaccines only offer moderate protection; confound serodiagnosis
- Negative test when purchased
  - Quarantine/ isolated; test twice 4-6 weeks apart

Cleaning

- Proper cleaning and disinfection is a MUST
  - Can be stable in environment for up to 2 months
  - Can withstand
    - Drying in organic debris, freezing, water, dust, soil
- Readily inactivated by common disinfectants and sunlight
- Wear personal protective equipment
  - Gloves, mask, goggles
- Use a biodegradable enzyme based kennel degreaser 1st (Make sure to rinse after use)
- Use disinfectant on all surfaces (allow at least a 10 minute contact time), rinse after use, allow to dry completely

Humans

- **Call your doctor**
- Symptoms
  - 5 days to several months
    - 2 weeks average
  - Intermittent fever persists for 1 to 5 weeks, anorexia, weight loss, abdominal and joint pain, headache, backache, weakness, irritability, insomnia, depression, emotional instability, constipation, splenomegaly (enlarged spleen), enlarged lymph nodes, hepatomegaly (enlarged liver), orchitis (swollen testicles), osteomyelitis (bone infection), miscarriage
  - Fatal
    - Endocarditis (heart infection), Severe CNS complications
- Testing Options

- Culture
  - Blood, Bone marrow, Cerebrospinal fluid
- No serologic test for *B. canis*

➢ Treatment

- Combination of antibiotics, Might need pain medication, Prolonged treatment might be necessary, Relapse is possible, Humans can clear the infection

➢ Conclusion

- It is zoonotic, symptoms are variable, no single test, no treatment, it is a devastating disease

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