

MARINE MAMMAL BRUCELLA

Animal Group(s) Affected	Transmission	Clinical Signs	Severity	Treatment	Prevention and Control	Zoonotic
<p>Marine mammals, humans.</p> <p>Experimental disease has been demonstrated in cattle and guinea pigs, suggesting other terrestrial animals are likely susceptible.</p>	<p>Unknown, but likely similar to terrestrial species, including <i>in utero</i> (vertical transmission), ingestion of milk or contaminated fish, mucous membrane exposure, sexual contact, or contact with infected placenta or birthing fluids; lungworm-associated infections are reported.</p>	<p>Variable, depending on affected organ system and strain of bacteria; ranges from non-apparent disease to stranding, abortion, infertility (including orchitis and epididymitis), neurologic signs, cutaneous lesions, osteomyelitis, cardiovascular disease and respiratory distress/disease have been reported in cetaceans.</p>	<p>Variable; serologic evidence of exposure without clinical disease is frequently seen.</p> <p>Cetaceans may exhibit acute or chronic disease states; pathology in pinnipeds is not reported.</p>	<p>A single case of successful treatment of a pulmonary abscess, including intra-lesional amikacin and oral doxycycline and rifampin, has been reported.</p> <p>WHO reported that human disease may respond to similar antibiotic treatment including rifampin and doxycycline.</p>	<p>Not well defined; serological tests can be used for screening.</p> <p>PCR or culture may identify animals actively shedding bacteria.</p> <p>General biosecurity and quarantine protocols.</p>	<p>Yes.</p>

Fact Sheet compiled by: Inga Sidor; updated by Stephen E. Cassle

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Susceptible animal groups: All marine mammals, including cetaceans, pinnipeds, sea otters, and polar bears; also humans.

Causative organism: *Brucella* spp., currently identified as *B. ceti* (in cetaceans) and *B. pinnipedialis* (in pinnipeds), although molecular characterization suggests three putative types of *B. ceti*: dolphin type, porpoise type and a human isolate.

Zoonotic potential: Yes; three human cases have been reported. Outside of laboratory-associated infection, the route of exposure is not known, but food-borne exposure is suspected. Typing of human isolates suggests increased zoonotic potential associated with a single genotype. Occupational exposure and seroconversion of people in the marine mammal field has not been documented to date.

Distribution: Globally distributed in wild species of cetaceans (50% of cetacean families have measureable antibodies to *B. ceti* and four families have been culture or PCR positive) and pinnipeds. Seroprevalance fluctuates in wild populations over time.

Incubation period: Not defined.

Clinical signs: Variable, depending on affected organ system and strain of bacteria. Although bacterial strains are host-associated, cross-species infections occur frequently, and may affect expression of disease.

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Seropositivity and bacterial isolation are reported in pinnipeds without overt disease or pathology, suggesting host-adapted or low-pathogenicity strains. Stranding, inanition, infertility, abortion, neurologic signs, cutaneous and pulmonary abscessation and musculoskeletal disorders have been reported in cetaceans.

Post mortem, gross, or histologic findings: None reported in pinnipeds. In cetaceans, lesions are primarily seen in reproductive tract (orchitis/epididymitis, necrotizing placentitis/endometritis), reticuloendothelial/hemolymphatic systems (lymphadenitis, splenic necrosis), central nervous system (meningoencephalitis) and musculoskeletal system (discospondylitis/osteomyelitis); blubber abscesses, visceral necrosis and abscessation, mastitis, and pulmonary granulomas also are reported. Multiple cases of lungworm-associated pneumonia have been seen with isolation of marine *Brucella* sp.

Diagnosis: Diagnosis can be divided into direct identification and indirect screening methods of detection. Bacterial isolation in culture from infected materials (CSF, brain, lymph node, and lung are most commonly used) remains the gold standard; however this method is difficult at best. Farrell's media or *Brucella*-agar with 5% horse blood may be used and incubated with 5-10% CO₂ for up to 14 days. Molecular characterization by polymerase chain reaction (PCR) methods include outer membrane protein polymorphisms, infrequent restriction site-derivative PCR, insertion sequence IS711 profiling, multilocus sequence typing (MLST) and multiple loci variable number tandem repeat analysis (MLVA) has been used to distinguish types. Immunohistochemical staining can identify the presence of bacteria in tissues, but has not proved to be as sensitive as other methods for surveillance. A number of serologic methods are available for screening (*i.e.* Rose Bengal test and buffered plate agglutination test, the complement fixation test, enzyme-linked immunosorbent assays (ELISA) or the fluorescence polarization assay (FPA), but sensitivity and specificity are variable and seropositivity does not correlate with active disease or bacterial shedding.

Material required for laboratory analysis: Fresh or frozen tissue, especially aborted fetuses (stomach contents, spleen and lung), fetal membranes, vaginal secretions (swabs), reticuloendothelial system (lymph nodes and spleen), brain/spinal cord/CSF, liver and kidney, or other gross lesions. In live animals, bacteria have been recovered from feces, fine needle aspirates and lungworms, but false negatives may be seen.

Relevant diagnostic laboratories: Clinicians with susceptible populations of marine animals should inquire about routine bacteriologic testing through their local or regional veterinary or medical diagnostic laboratories.

For culture and bacterial typing:

USDA/APHIS National Veterinary Services Laboratories

Mycobacteria and Brucella Section— National Reference Laboratory

1920 Dayton Ave.

Ames, Iowa 50010

(515) 337-7388

http://www.aphis.usda.gov/animal_health/lab_info_services/diagnos_tests.shtml

Routine culture:

UC Davis VMTH Microbiology Laboratory

Central Laboratory Receiving, Room 1033

1 Garrod Drive

Davis, CA 95616-8747

(530) 752-8684

Marine mammal cELISA and qPCR:

Mystic Aquarium & Institute for Exploration

Dept. of Research and Veterinary Services

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Tracy Romano
55 Coogan Blvd.
Mystic, CT 06355-1997
(860) 572-5955

Treatment: A single successful treatment of pulmonary abscess was reported in a captive dolphin. The treatment included intra-lesional amikacin followed by six to eight weeks of oral doxycycline and rifampin.

Prevention and control: Surveillance using serological tests can be used for screening population exposure. Blowhole and/or fecal PCR may identify animals actively shedding bacteria. General biosecurity and quarantine protocols are recommended for marine mammal rehabilitation and aquarium facilities.

Suggested disinfectant for housing facilities: General measures for cleaning and disinfection should reduce environmental bacterial contamination, as *Brucella* bacteria are readily killed by common disinfectants and do not appear to live long outside the host cells.

Notification: Marine strains of *Brucella* are not currently reportable to State, Provincial or Federal bodies.

Measures required under the Animal Disease Surveillance Plan: Currently none.

Measures required for introducing animals to infected animal: These measures are not yet defined in marine species. Paired serology may be recommended for animals planned to be introduced, including use of appropriate quarantine protocols.

Conditions for restoring disease-free status after an outbreak: Not defined in marine species.

Experts who may be consulted:

Inga F. Sidor, DVM
New Hampshire Veterinary Diagnostic Laboratory, University of New Hampshire
129 Main St
Durham, NH 03824
inga.sidor@unh.edu

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