



Department of Health and Social Services  
William J. Streur, Commissioner

Division of Public Health  
Ward Hurlburt, MD, MPH, CMO/Director

Editor:  
Joe McLaughlin, MD, MPH

3601 C Street, Suite 540  
Anchorage, AK 99503

<http://www.epi.Alaska.gov>

Local (907) 269-8000  
24 Hour Emergency 1-800-478-0084

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## Human and Animal Brucellosis in Alaska

### Background

Brucellosis is a systemic bacterial infection that can result in pronounced disability. There are several species of *Brucella* and multiple serovars exist within some species. Humans are typically exposed to *B. suis* through direct contact with an infected animal (e.g., from butchering a diseased caribou) and to *B. melitensis* through contact with an infected animal product (e.g., from drinking raw milk). Brucellosis is a category B bioterrorism agent. The incubation period for brucellosis varies from 5–90 days after exposure. Symptoms can persist for a year or more if brucellosis is not adequately treated.

In Alaska, brucellosis in humans is a condition reportable to the Alaska Section of Epidemiology (SOE), and brucellosis in animals is a condition reportable to animal health authorities. Historically, locally-acquired human cases of brucellosis in Alaska have been *B. suis* serovar IV, which is associated with contact with infected reindeer or caribou.<sup>1</sup>

### Case Definition

Brucellosis is characterized by acute or insidious onset of fever and at least one of the following: fatigue, night sweats, arthralgia, headache, anorexia, myalgia, weight loss, spondylitis/arthritis, meningitis, or focal organ involvement (e.g., endocarditis, hepatomegaly, orchitis/epididymitis, and splenomegaly). Cases are classified as definitive or presumptive, based on laboratory results.

**Definitive case:** A clinically compatible illness with

- a positive culture from clinical specimens, or
- a fourfold or greater change in antibody titer between acute and convalescent serum specimens obtained >2 weeks apart.

**Presumptive case:** A clinically compatible illness with

- a *Brucella* total antibody titer of  $\geq 160$  by standard tube agglutination test or *Brucella* microagglutination test, or
- detection of *Brucella* DNA in a clinical specimen by polymerase chain reaction (PCR) assay.

The Alaska State Public Health Laboratory (ASPHL) in Anchorage evaluates specimens by serologic, culture, and PCR methods. *Brucella* spp. testing is not routinely requested; five clinical test requests have been received since 2000.

### Brucellosis Diagnosed in Alaskans

From 1958–1981, 24 human cases of brucellosis were reported to SOE; some cases were not acquired in Alaska.<sup>1</sup> From 1982–2010, an additional seven cases were reported, yielding an average of one case reported every 2 years for the past 50 years. Information about exposure was available for four of the seven recent cases; three (75%) reported exposure to reindeer or caribou carcasses and one (25%), exposure to raw milk overseas.

To assess brucellosis underreporting, the Indian Health Service's National Patient Information Resource System (NPIRS) was searched for Alaska brucellosis patients in 2000–2010. No additional confirmed cases were found. Three patients with clinically compatible illness had brucellosis listed as a possible diagnosis; however, no laboratory testing was performed.

### Brucellosis in Alaska Animals

Alaska was classified as Brucellosis-free in 1982, after eradicating *B. abortus* from domestic livestock. Brucellosis surveillance is maintained at the United States Department of Agriculture-inspected slaughter facilities and dairy herds in the state. Testing is required for intrastate movement of cervidae and for importation of livestock to Alaska. In collaboration with the Office of the State Veterinarian (OSV) and the University of Alaska Fairbanks Reindeer Program, the Kawerak Reindeer Herders Association uses a vaccine in the free ranging reindeer herds on the Seward Peninsula to prevent *B. suis* serovar IV

infection resulting from exposure to the western Arctic caribou herd. Brucellosis in animals is a reportable condition to the OSV. Since 1982, no cases of *B. abortus* and <3 cases per year of *B. suis* have been documented among domestic livestock. Two cases of *B. canis* have been reported in dogs.

The Alaska Department of Fish and Game (ADFG) has conducted several serological surveys of various wildlife; acute clinical illness has rarely been confirmed. More information is available on-line.<sup>2</sup>

### Discussion

Human brucellosis is a rarely reported zoonotic illness in Alaska. Locally-acquired cases of *B. suis* serovar IV infection have historically (and recently) been associated with contacting infected caribou or reindeer carcasses. Based on a limited review of the NPIRS administrative health records and the fact that only five clinical *Brucella* test requests have been received at ASPHL since 2000, in Alaska, brucellosis might be underconsidered in the work-up of patients with a fever of unknown origin.

Serologic findings suggest that *Brucella* organisms are present among Alaska wildlife; however, the current extent and thereby the attendant risk to humans handling those animals is unclear.

### Recommendations

1. Brucellosis in humans should be suspected in patients with a compatible clinical picture and history of exposure to likely infected animals or raw dairy products within the previous 90 days. Healthcare providers should report patients with suspected brucellosis to SOE at (907) 269-8000 from 8AM-5PM Mon-Fri.
2. Alaska clinical laboratories that perform routine microbiology diagnostics should refer specimens to ASPHL for confirmatory testing. Isolation of *Brucella* spp. in blood culture is often delayed compared to other bloodstream pathogens. Incubate broth blood cultures according to established guidelines.<sup>3</sup> For questions about appropriate specimen testing and handling, contact ASPHL at 907-334-2100; or see information available on-line at: [http://www.hss.state.ak.us/dph/labs/publications/image/Lab\\_Svcs\\_Manual.pdf](http://www.hss.state.ak.us/dph/labs/publications/image/Lab_Svcs_Manual.pdf)
3. Wildlife suspected to have brucellosis should be reported to the ADFG Wildlife Veterinarian at (907) 459-7257 or via email at [dfg.dwc.vet@alaska.gov](mailto:dfg.dwc.vet@alaska.gov)
4. Reports of suspected brucellosis in domesticated animals or concerns about regulations regarding transport of animals should be directed to the OSV at (907) 375-8214.
5. Gloves and strict attention to hand hygiene when butchering any animal are recommended to reduce exposure to *Brucella* spp., and many other infectious pathogens that may be present in an animal. Foodborne brucellosis can be prevented by avoiding raw or unpasteurized milk products, especially when overseas.
6. Additional historic information and information for consumers of subsistence food can be found on-line in the 2010 Alaska Native Tribal Health Consortium (ANTHC) Climate and Health Bulletins on brucellosis.<sup>4</sup>

### Acknowledgement

NPIRS data review performed by Cassandra Fox, DVM, Centers for Disease Control and Prevention, Arctic Investigations Program extern, February 2011.

### References

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