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Q Fever in Alaska

Background

Q fever is a disease that can lead to fever, headache, weight loss and chills, and occasionally more serious outcomes such as endocarditis, granulomatous hepatitis, pneumonia, and post-infectious fatigue syndrome. *Coxiella burnetii*, the bacteria that causes Q fever in both humans and animals worldwide, is known to exist in Alaska. *Coxiella* are present in the birthing products of infected animals, urine, feces, and milk, and can form resistant spores that remain in the environment for extended periods. Illness results after direct contact with infected animals or by breathing in contaminated dust. Less than half of persons infected with *C. burnetii* develop symptoms; pregnant women, persons who are immune compromised, and persons who have a pre-existing heart condition are at higher risk for more serious sequelae.

Q fever can be diagnosed in humans by testing serum for IgG and IgM antibodies against *C. burnetii* Phase I and II antigens using indirect immunofluorescence assay (IFA). A fourfold rise in IgG Phase II antibodies between paired sera taken 2–4 weeks apart is the gold standard for diagnosing acute infection. A single high Phase II IgG titer ($\geq 1:128$) is considered evidence of probable infection. IgM testing alone should not be used for diagnosis, as false positives may occur. Acute Q fever can also be diagnosed in humans by testing whole blood for *Coxiella* DNA using a polymerase chain reaction (PCR) assay (Table). PCR can also be performed on biopsy specimens to diagnose chronic Q fever cases.

Table. Testing Assays for Diagnosing Acute Q Fever

Type of Sample	Time from Illness Onset to Specimen Collection	Type of Assay
Whole blood	1–7 days (prior to antibiotic therapy)	PCR
Serum - Acute - Convalescent	1–7 days 21–35 days	IFA for Phase I and II IgG and IgM

Coxiella in Alaska

Human *Coxiella* infection was made a condition reportable to the Alaska Section of Epidemiology (SOE) in 2007. Since then, one confirmed case was reported in an Alaskan exposed to *Coxiella* overseas; however, no locally-acquired cases of Q fever have been reported.

Similarly, active cases of Q fever among domestic animals are reportable to the Alaska Department of Environmental Conservation's Office of the State Veterinarian (ADEC/OSV). No clinical cases of Q fever in domestic livestock are on record and no serologic surveillance has been performed.

Among wildlife, antibodies to *Coxiella* have been detected in Dall's sheep, caribou, arctic fox, and wolves dating back to the 1970s.^{1,2} Since 2004, the Alaska Department of Fish and Game (ADFG) has routinely tested for *Coxiella* antibodies in over 3,000 caribou, muskoxen, mountain goats, Dall's sheep, wolves, and grizzly bears; caribou were found to have the highest antibody prevalence at 25% (*personal communication, Dr. Kimberlee Beckmen, ADFG, 8/22/2011*). No cases of clinical illness have been identified in terrestrial wildlife.

Coxiella have also been detected in marine mammals.^{3,4} In 2010, researchers from the Colorado State University (CSU) collected placentas from a northern fur seal rookery on St. Paul Island. Of the 146 placentas tested, 5 (3%) were positive for *C. burnetii* by immunohistochemical staining, and 109

(75%) were positive for *C. burnetii* DNA by PCR.⁵ In 2011, CSU researchers collected over 100 additional fur seal placentas and other environmental samples; the samples have not yet been analyzed.

Strategic Plan

Because it is unclear if *Coxiella* represent a health concern for marine mammals and what risks infected animals might present to people interacting with them, the National Oceanographic and Atmospheric Administration conducted a strategic planning workshop in Seattle, Washington in April 2011. The objectives of the workshop were as follows: 1) to provide current information on *Coxiella* in humans, domestic animals, and terrestrial and marine wildlife along the West Coast of the United States and Canada; 2) to determine questions that need to be addressed regarding the potential health impacts of *Coxiella* on humans and animals living in these areas; and 3) to devise appropriate research and communication strategies.

Based on the strategic plan, several activities were proposed to learn more about *Coxiella* in a variety of marine mammals, including northern fur seals, Steller sea lions, ice seals, and walrus, and other terrestrial mammals and bird species on the Pribilof Islands. In addition, a plan was developed to evaluate stored sera collected from residents of St. Paul and St. George in the 1980s and 1990s to determine if antibodies to *C. burnetii* are present in these populations due to their frequent exposure to northern fur seals. This will aid in quantifying potential past human infections, in planning for future activities, and in developing prevention recommendations.

Recommendations

1. Health care providers seeing patients with unexplained febrile illness should consider Q fever in the differential diagnosis, especially if the patient presents with prolonged fever and elevated liver enzymes.
2. To prevent severe complications from developing, treatment should be based on clinical suspicion alone and should be started before laboratory results return. Doxycycline (100 mg twice a day for 2–3 weeks) is the treatment of choice for acute Q fever in adults.
3. *Coxiella* infection in humans is reportable to SOE by health care providers and laboratories (7 AAC 27.005). Please call (907) 269-8000 to reach SOE staff Mon–Fri 8AM to 5PM. Confidential messages can be left at (907) 561-1324 or (800) 478-1700 if outside Anchorage.
4. *Coxiella* infection in animals is reportable to ADEC/OSV. Veterinarians and livestock owners are encouraged to call (907) 375-8215 to report positive cases or report morbidity that may be associated with *Coxiella* infection.
5. A fact sheet "*Coxiella burnetii* (Q Fever): Frequently Asked Questions for Alaskans" is available at: <http://www.epi.alaska.gov/id/dod/QFeverFAQ.pdf>

References

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