State of Alaska Epidemiology Bulletin

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Q Fever in Alaska – Update

Background

Coxiella burnetii is a bacterium with worldwide prevalence that can infect many animal species. Infection with *C. burnetii* in humans can cause an illness called Q fever, which is characterized by fever, headache, weight loss, chills, and occasionally more serious sequelae such as endocarditis, pneumonia, and granulomatous hepatitis. In 2010, *C. burnetii* was detected in the placentas of northern fur seals from St. Paul Island, and a *Bulletin* was subsequently released to inform health care providers and the public.[1] Since then, further investigative work has led to a better understanding of the implications of the initial findings. The purpose of this *Bulletin* is to provide an update to the 2011 report.

Updated Human Testing Guidelines

Q fever can be diagnosed by testing serum for IgG and IgM antibodies against *C. burnetii* phase I and II antigens using an indirect immunofluorescent assay, or whole blood for *Coxiella* DNA using a polymerase chain reaction assay (Table). Timing for sample collection was updated in 2013.[2] Since 2011, although limited testing has occurred, no locally-acquired cases of Q fever have been identified in Alaska.

Table. Testing Assays for Diagnosing Q Fever

Sample Type	Interval since Symptom Onset	Assay Type
Whole blood		
- Acute	Until day 14*	PCR†
- Chronic	>6 weeks after acute illness	PCR†
Serum		
- Acute	Until day 21 Until day 14*	IFA± PCR†
- Convalescent	3–6 weeks after acute sample	IFA±
- Chronic	>6 weeks after acute illness	IFA±; PCR†

**Prior to antibiotic therapy; †Polymerase chain reaction assay*
±Immunofluorescent assay for phase I and II IgG and IgM

Banked Human Serum Testing Results

In 2013, the Centers for Disease Control and Prevention (CDC) tested 621 banked serum samples from Pribilof Island residents (470 from St. Paul and 151 from St. George; collected during 1980–2000) for antibodies to *C. burnetii*. Participant's ages ranged from <1 to 91 years (median: 27 years); 332 (53%) were male. Twelve percent (72/621) had a positive phase II IgG antibody titer at a level of ≥1:64. Seroprevalence was 12% (56/470) in residents from St. Paul and 11% (16/151) in residents from St. George. No statistically significant difference in seropositivity was identified by sex, year of specimen draw, or island of residence. Persons aged ≥20 years were nearly twice as likely to have had a positive test compared to persons aged <20 years (13% [58/433] vs. 7% [14/188], respectively).

Animal and Environmental Testing Results

Through a collaborative effort between CDC, the National Oceanic and Atmospheric Administration, and Colorado State University, newly collected and banked samples obtained during 1994–2011 were tested from marine mammals and samples collected from the environment. Of the 308 serum samples tested from Alaska northern fur seals and Steller sea lions, 192 (62%) had a positive phase II IgG antibody titer at a level of ≥1:128.[3] Genetic analysis of *C. burnetii* found from northern fur seals shows that these strains have distinctive sequences compared to strains traditionally associated with human Q fever. Additional serologic testing of marine mammals in the northwestern U.S. has also demonstrated evidence of *Coxiella* exposure.[4]

Environmental soil testing performed on St. Paul during 2011 found that the presence of *C. burnetii* DNA was identified predominantly in close proximity to northern fur seal rookeries;[5] *C. burnetii* DNA was also found in samples taken from sites where birds roost on St. Paul Island. The genetic signatures of these strains were more similar to terrestrial *Coxiella* strains than to marine mammal-associated strains.

Discussion

The results of this investigation confirm that *Coxiella* bacteria are not new to Alaska; however, the relationship between serologic data and illness in humans or animals remains unclear. The human seroprevalence data indicate that Pribilof Island residents were much more likely than the general adult U.S. population to have a positive *C. burnetii* antibody titer (12% at a titer level of ≥1:64 vs. 3% at a titer level of ≥1:16, respectively).[6] Seroprevalence rates for the Alaska population as a whole or other Alaska sub-populations (e.g., those who harvest marine mammals for subsistence) have not been estimated. Seroprevalence rate estimates in groups with a high likelihood of exposure to *C. burnetii* have varied widely; for example, one study found that 22% of a sample of 508 U.S. veterinarians tested positive at a titer level of ≥1:16,[7] and another study found that 70% of surveyed dairy farmers in the Netherlands had a positive antibody titer at a level of ≥1:32.[8] Inconsistency in titer cut-off thresholds across studies complicates the comparisons of results between populations.

Recommendations

1. Health care providers should consider Q fever in the differential diagnosis for patients with unexplained febrile illness, especially if the patient presents with prolonged fever and elevated liver enzymes.
2. Providers should initiate antibiotic therapy in suspected Q fever cases before laboratory results return; doxycycline (100 mg twice a day for 2 weeks) is the treatment of choice for acute Q fever in adults.[2]
3. Report cases of *Coxiella* infection in humans to the Section of Epidemiology--call (907) 269-8000 Mon–Fri 8AM to 5PM. Confidential messages can be left at (907) 561-1324 or (800) 478-1700 if outside Anchorage.
4. Veterinarians and livestock owners should call (907) 375-8215 to report confirmed or suspected animal cases of *Coxiella* infection to the Office of the State Veterinarian.
5. Review the *Coxiella burnetii (Q Fever): Frequently Asked Questions for Alaskans* fact sheet, available at: http://www.epi.alaska.gov/id/dod/QFeverFAQ.pdf

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