

## Q FEVER

Last revised August 16, 2011

*Note that there are separate case definitions for Acute Q fever and Chronic Q fever*

*Coxiella burnetii* occurs in two antigenic phases called phase I and phase II. This antigenic difference is important in diagnosis. In acute cases of Q fever, the antibody level to phase II is usually higher than that to phase I, often by several orders of magnitude, and generally is first detected during the second week of illness. In chronic Q fever, the reverse situation is true (i.e., phase I titers are higher than phase II). Thus, high levels of antibody to phase I in later specimens in combination with constant or falling levels of phase II antibodies and other signs of inflammatory disease suggest chronic Q fever. Antibodies to phase I and II antigens have been known to persist for months or years after initial infection. Serologic profiles of pregnant women infected with acute Q fever during gestation may progress rapidly to those characteristic of chronic infection.

### ACUTE Q FEVER

#### I. IDENTIFICATION

- A. **CLINICAL DESCRIPTION:** An acute febrile zoonotic disease caused by the rickettsial organism *Coxiella burnetii*. Typical manifestations include acute fever usually accompanied by rigors, myalgia, malaise, and a severe retrobulbar headache. Fatigue, night-sweats, dyspnea, confusion, nausea, diarrhea, abdominal pain, vomiting, non-productive cough, and chest pain have also been reported. Severe disease can include acute hepatitis, atypical pneumonia with abnormal radiograph, and meningoencephalitis. Pregnant women are at risk for fetal death and abortion. Clinical laboratory findings may include elevated liver enzyme levels, leukocytosis, and thrombocytopenia. Asymptomatic infections are relatively common.
- B. **REPORTING CRITERIA:** Clinical diagnosis with confirmatory or supportive laboratory findings
- C. **CLINICAL CRITERIA:** Acute fever and one or more of the following: rigors, severe retrobulbar headache, acute hepatitis, pneumonia, or elevated liver enzyme levels.
- D. **LABORATORY CRITERIA FOR CONFIRMATION:**
  1. *Laboratory confirmed:*
    - Serological evidence of a fourfold change in immunoglobulin G (IgG)-specific antibody titer to *C. burnetii* phase II antigen by indirect immunofluorescence assay (IFA) between paired serum samples, (CDC suggests one taken during the first week of illness and a second 3-6 weeks later, antibody titers to phase I antigen may be elevated or rise as well), **or**
    - Detection of *C. burnetii* DNA in a clinical specimen via amplification of a specific target by polymerase chain reaction (PCR) assay, **or**
    - Demonstration of *C. burnetii* in a clinical specimen by immunohistochemical methods (IHC), **or**
    - Isolation of *C. burnetii* from a clinical specimen by culture.
  2. *Laboratory supportive:*
    - A single supportive IFA IgG titer of  $\geq 1:128$  to phase II antigen (phase I titers may be elevated as well) **or**

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- Serologic evidence of elevated phase II IgG or IgM antibody reactive with *C. burnetii* antigen by enzyme-linked immunosorbent assay (ELISA), dot-ELISA, or latex agglutination.

Note: For acute testing, CDC uses in-house IFA IgG testing (cutoff of  $\geq 1:128$ ), preferring simultaneous testing of paired specimens, and does not use IgM results for routine diagnostic testing

### E. WISCONSIN CASE DEFINITION:

1. *Confirmed acute Q fever*: A laboratory confirmed case that either meets clinical case criteria or is epidemiologically linked to a lab confirmed case.
2. *Probable acute Q fever*: A clinically compatible case of acute illness (meets clinical criteria for acute Q fever illness) that has laboratory supportive results for past or present acute disease (antibody to Phase II antigen) but is not laboratory confirmed.

## II. ACTIONS REQUIRED / PREVENTION MEASURES

### A. WISCONSIN DISEASE SURVEILLANCE CATEGORY II:

Report to the patient's local health department either electronically through the Wisconsin Electronic Disease Surveillance System (WEDSS), by mail or fax using an Acute and Communicable Disease Case Report ([F-44151](#)), or by other means within 72 hours upon recognition of a case or suspected case.

### B. EPIDEMIOLOGY REPORTS REQUIRED:

- *Electronically* – Report through WEDSS, including appropriate disease-specific tabs  
OR
- *Paper Copy* – Acute and Communicable Diseases Case Report ([F-44151](#)) along with Q Fever Case Report Form: [http://www.cdc.gov/qfever/pdfs/qfevercasereport\\_2010.pdf](http://www.cdc.gov/qfever/pdfs/qfevercasereport_2010.pdf)

### C. PUBLIC HEALTH INTERVENTIONS:

In accordance with Wisconsin Administrative rule DHS 145.05, local public health should follow the methods of control recommended in the current edition of *Control of Communicable Diseases Manual*, edited by David L. Heymann, published by the American Public Health Association. Briefly:

1. Educate persons in high-risk occupations (sheep and dairy farmers, veterinarian researchers) on the sources of infection and the necessity for adequate disinfection and infection control measures.
2. Appropriately dispose of placenta, birth products, fetal membranes, and aborted fetuses at facilities housing sheep and goats.
3. Restrict access to barns and laboratories used in housing potentially infected animals.
4. Use only pasteurized milk and milk products.
5. Use appropriate procedures for bagging, autoclaving, and washing of laboratory clothing.
6. Counsel persons at highest risk for developing chronic Q fever, especially pregnant women, immune suppressed persons, persons with pre-existing cardiac valvular disease or individuals with vascular grafts.
7. DPH recommendations exist for workers on farms where Q fever has been diagnosed in livestock. Call the State Public Health Veterinarian for these.

D. BIOTERRORISM CONSIDERATIONS:

*Coxiella burnetii* is a highly infectious agent that is relatively resistant to heat and drying. It can become airborne and inhaled by humans. A single organism may cause disease in a susceptible person. This agent could be developed for use in biological warfare and is considered a potential terrorist threat.

III. CONTACTS FOR CONSULTATION

A. LOCAL HEALTH DEPARTMENT – REGIONAL OFFICES – TRIBAL AGENCIES:  
<http://www.dhs.wisconsin.gov/localhealth/index.htm>

B. BCDER / COMMUNICABLE DISEASE EPIDEMIOLOGY SECTION: (608) 267-9003

C. WISCONSIN STATE LABORATORY OF HYGIENE / BACTERIOLOGY: (608) 263-3421

IV. RELATED REFERENCES

- Heymann DL, ed. Q Fever. In: *Control of Communicable Diseases Manual*. 19th ed. Washington, DC: American Public Health Association, 2008:494-498.
- Pickering LK, ed. Q Fever. In: *Red Book: 2009 Report of the Committee on Infectious Diseases*. 28th ed. Elk Grove Village, IL: American Academy of Pediatrics, 2009:550-552.

## **CHRONIC Q FEVER**

I. IDENTIFICATION

A. CLINICAL DESCRIPTION: Infection with *Coxiella burnetii* that persists for more than 6 months. Potentially fatal endocarditis may evolve months to years after acute infection, particularly in persons with underlying valvular disease. Infections of aneurysms and vascular prostheses have been reported. Immunocompromised individuals are particularly susceptible. Rare cases of chronic hepatitis without endocarditis, osteomyelitis, osteoarthritis, and pneumonitis have been described.

B. REPORTING CRITERIA: Clinical diagnosis with confirmatory or supportive laboratory findings

C. CLINICAL CRITERIA: Newly recognized, culture-negative endocarditis, particularly in a patient with previous valvulopathy or compromised immune system, suspected infection of a vascular aneurysm or vascular prosthesis, or chronic hepatitis, osteomyelitis, osteoarthritis, or pneumonitis in the absence of other known etiology.

D. LABORATORY CRITERIA FOR CONFIRMATION:

1. *Laboratory confirmed:*

- Serological evidence of IgG antibody to *C. burnetii* phase I antigen  $\geq 1:800$  by IFA (while phase II IgG titer will be elevated as well; phase I titer is higher than the phase II titer), **or**
- Detection of *C. burnetii* DNA in a clinical specimen via amplification of a specific target by PCR assay, **or**
- Demonstration of *C. burnetii* antigen in a clinical specimen by IHC, **or**
- Isolation of *C. burnetii* from a clinical specimen by culture.

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### 2. *Laboratory supportive:*

- An antibody titer to *C. burnetii* phase I IgG antigen  $\geq 1:128$  and  $< 1:800$  by **IFA**.

Note: Samples from suspected chronic patients should be evaluated for IgG titers to both phase I and phase II antigens. Current commercially available ELISA tests (which test only for phase 2) are not quantitative, cannot be used to evaluate changes in antibody titer, and hence are not useful for serological confirmation. IgM tests are not strongly supported for use in serodiagnosis of acute disease, as the response may not be specific for the agent (resulting in false positives) and the IgM response may be persistent. Complement fixation (CF) tests and other older test methods are neither readily available nor commonly used.

Serologic test results must be interpreted with caution, because baseline antibodies acquired as a result of historical exposure to Q fever may exist, especially in rural and farming areas.

### E. WISCONSIN CASE DEFINITION:

1. *Confirmed Chronic Q fever:* A clinically compatible case of chronic illness (meets clinical evidence criteria for chronic Q fever) that is laboratory confirmed for chronic infection.
2. *Probable Chronic Q fever:* A clinically compatible case of chronic illness (meets clinical evidence criteria for chronic Q fever) that has laboratory supportive results for past or present chronic infection (antibody to Phase I antigen).

## II. ACTIONS REQUIRED / PREVENTION MEASURES

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Report to the patient's local health department either electronically through the Wisconsin Electronic Disease Surveillance System (WEDSS), by mail or fax using an Acute and Communicable Disease Case Report ([F-44151](#)), or by other means within 72 hours upon recognition of a case or suspected case.

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2. Appropriately dispose of placenta, birth products, fetal membranes, and aborted fetuses at facilities housing sheep and goats.
3. Restrict access to barns and laboratories used in housing potentially infected animals.
4. Use only pasteurized milk and milk products.
5. Use appropriate procedures for bagging, autoclaving, and washing of laboratory clothing.

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6. Counsel persons at highest risk for developing chronic Q fever, especially pregnant women, immune suppressed persons, persons with pre-existing cardiac valvular disease or individuals with vascular grafts.
7. DPH recommendations exist for workers on farms where Q fever has been diagnosed in livestock. Call the State Public Health Veterinarian for these.

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- Pickering LK, ed. Q Fever. In: *Red Book: 2009 Report of the Committee on Infectious Diseases*. 28th ed. Elk Grove Village, IL: American Academy of Pediatrics, 2009:550-552