Q Fever
By Humberto Estrada

Historical information:
In 1937 the bacterium was isolated from patients and in 1938, H.R. Cox and Gordon Davis isolated it from ticks and identified it as a species similar to Legionella and Francisella (2).

Classification:
proteobacterium - a short, pleomorphic rod that is a strict intracellular bacterium; can be cultivated in embryonated eggs, laboratory animals, and in vitro cell culture systems; can be cultured in axenic media (1)

Etiologic agent/ key tests:
• caused by the gram-negative coccobacillus Coxiella burnetii
• Resides and reproduces in phagolysosomes of host monocytes and macrophages (3)

General Characteristics:
Two forms exist:
• large cell variant is a vegetative form found in infected cells
• small cell variant is the extracellular infectious form that is shed in milk, urine, and feces and found in high concentration in placental tissue and amniotic fluid; is resistant to heat, drying, and many common disinfectants and remains viable for weeks to months in the environment (3)

This infection has an antigenic variation, called phase variation; phase I, its highly infectious and a single bacterium is sufficient to infect a human; this form is isolated from animals or humans. After sub culturing of its lipopolysaccharide capsule, which results in an antigenic shift to phase II (which is not infectious). A sporulation-like process protects the organism from the external environment, where it can survive for long periods of time (1). In animals, the infection may cause abortions and stillbirth. Most animals are relatively asymptomatic and in humans, acute infections may be asymptomatic or manifest as a self-limiting febrile illness, pneumonia, or hepatitis (4)

Treatment/Control:
• A vaccine has been developed for use in animals and humans but it is not available in the United States.
• Individuals who have been exposed to should not receive the vaccine because severe reactions may occur.
• The use of doxycycline is recommended; is the first line treatment; is most effective at preventing severe complications for all adults, and for children with severe illness. Severely ill patients may require longer periods before their fever resolves.

The following measures should be used in the prevention and control:
• Educate the public on sources of infection.
- Appropriately dispose of placenta, birth products, fetal membranes, and aborted fetuses at facilities housing sheep and goats.
- Restrict access to barns and laboratories used in housing potentially infected animals.
- Use only pasteurized milk and milk products.
- Use appropriate procedures for bagging, autoclaving, and washing of laboratory clothing.
- Vaccinate (where possible) individuals engaged in research with pregnant sheep or live C. burnetii.
- Quarantine imported animals.
- Ensure that holding facilities for sheep should be located away from populated areas. Animals should be routinely tested for antibodies to C. burnetii, and measures should be implemented to prevent airflow to other occupied areas.
- Counsel persons at highest risk for developing chronic Q fever, especially persons with preexisting cardiac valvular disease or individuals with vascular grafts (2)

**Usual reservoirs/means of transmission:**

- The greatest risk of transmission occurs at parturition by inhalation, ingestion, or direct contact with birth fluids or placenta.
- Ticks may transmit the disease among domestic ruminants but are not thought to play an epidemiologically important role in transmission of disease to humans (3)

Bacteria infect sheep, goats, cattle, dogs, cats, birds, rodents, and ticks, as well as some other animals. Can be passed to or by:

- Birth products
- Feces
- Urine
- Farm/field animal placentas, fetal membranes, and aborted fetuses at facilities housing sheep and goats.
- Barns and laboratories used in housing potentially infected animals.
- Pasteurized milk and milk products of Farm/Field animals
- Imported animals.
- Holding facilities (5)

People at highest risk for this infection are:

- Farmers
- Laboratory workers
- Sheep and dairy workers
- Veterinarians (2)

**Signs and Symptoms of the disease:**

People can have symptoms without knowing it or mistake it for mild flu. Often, it is impossible to tell without laboratory tests. Sometimes, it strikes as a sudden illness, affecting a large number of people in the same workplace. Some patients develop a slight, dry cough because of a lung inflammation known as pneumonitis. Most symptoms disappear after 7-10 days. However, afflicted people can feel generally ill with loss of appetite for several weeks. A small percentage of patients develop hepatitis or liver disease and jaundice another rare clinical syndromes includes endocarditis.
There may be regional differences in the way the disease presents itself. It is not clear why but animal studies suggest different strains may be a factor.

Common signs and symptoms resemble a serious case of the flu:
- sudden onset of high fever
- fatigue
- muscle pain
- chills and sweating
- headache
- general feeling of sickness and loss of appetite

**Virulence Mechanisms:**
- There are regional variations in the disease - for example, pneumonia is more common in Crete, Switzerland, the Basque region of Spain and Nova Scotia.
- Animal studies indicate that strain differences could be a factor.
- Distribution is worldwide (except New Zealand), and the host range includes various wild and domestic mammals, arthropods, and birds.

The disease is enzootic in most areas where cattle, sheep, and goats are kept.
- In the USA, seroprevalence studies have shown antibodies to *C. burnetii* in 41.6% of sheep, 16.5% of goats, and 3.4% of cattle.

**Current Information/World stats:**
- In the United States, Q fever outbreaks have resulted mainly from occupational exposure involving veterinarians, meat processing plant workers, sheep and dairy workers, livestock farmers, and researchers at facilities housing sheep.
- In 1999, there was an increase from 17 cases with onset in 2000, to 167 cases with onset in 2007.
- During 2008–2010, the number decreased slightly.
- In 2010, 131 cases were reported; 106 were acute and 25 were chronic.

On a recent report in Brazil, refrigerator workers in Barbosa, felt ill for almost 2 months from Q fever. The disease is considered rare, and these would be among the 1st cases in Brazil. The diagnosis was reported to Municipal Health of Barbosa yesterday morning [15 Mar 2015] during a visit to the municipality of the director of the Center for Strategic Information for Health Surveillance of Sao Paulo, Gizelda Katz. Tests found 16 staff had been infected with the bacterium, however, Katz mentioned you cannot tell when there was transmission.

**Works Cited**


