**Bartonella Species**

**Disease Agents:**
- *Bartonella henselae*
- *Bartonella quintana*
- *Bartonella bacilliformis*

**Disease Agent Characteristics:**
- Gram-negative bacillus or coccobacillus, aerobic, nonmotile, nonspore-forming, facultative intracellular bacterium
- Order: Rhizobiales; Family: Bartonellaceae
- Size: 0.3–0.6 × 0.3–1.0 μm
- Nucleic acid: Approximately 1.6-2 × 10⁶ base pairs of DNA

**Disease Names:**

*Bartonella henselae*
- Cat scratch disease in normal hosts
- Bacillary angiomatosis in immune compromised hosts and bacillary peliosis are vasculo-proliferative manifestations of infection in immune compromised hosts

*Bartonella quintana*
- Trench fever under conditions of poor sanitation and hygiene
- Bacillary angiomatosis in immune compromised hosts

*Bartonella bacilliformis*
- Oroya fever
- Verruca peruana
- Carrion’s disease

**Priority Level:**
- Scientific/Epidemiologic evidence regarding blood safety: Theoretical
- Public perception and/or regulatory concern regarding blood safety: Absent
- Public concern regarding disease agent: Very low

**Background:**
- In 1909, A L Barton described organisms that adhered to RBCs.
- The name *Bartonella bacilliformis* was used for the only member of the group identified before 1993.
- Several other species of *Bartonella*, most importantly *henselae* and *quintana*, commonly infect humans, and at present, *B. henselae* represents by far the most common infecting agent in the US and is of greatest concern.
- They are primarily infections of non-human animals, with humans as incidental hosts.
- A variety of bartonellae from other species have been described infecting humans at the individual case report level.
- Stable in the population

- These organisms cause intraerythrocytic bacteremia, that can be chronic or relapsing, so concerns have been raised about transfusion transmission.
  - Infections with *B. bacilliformis* and *B. quintana* occur in populations unlikely to be qualified blood donors. The former is geographically restricted to the Andes mountains and is associated with significant acute and chronic morbidity, while infections with the latter occur primarily in conditions of poor sanitation and hygiene, especially among the homeless, and immune compromised persons.
  - In contrast, *B. henselae* is a common human pathogen.

**Common Human Exposure Routes:**
- *B. henselae* is commonly transmitted to humans by the bite or saliva-contaminated scratch of cats that are the natural reservoir for the bacteria.
- *B. bacilliformis* and *B. quintana* are vector-borne. Their non-human reservoirs are not yet identified.

**Likelihood of Secondary Transmission:**
- Unlikely

**At-Risk Populations:**
- Persons of all ages are at risk from *B. henselae*, but recognized infections primarily occur in children following rough play with cats.
- Immunocompromised persons are more likely to have complications.

**Vector and Reservoir Involved:**
- Chronically infected cats are the reservoir for *B. henselae*.
  - Recent evidence suggests exposure to infected fleas and ticks may also play a role in transmission to humans, but is controversial. The cat flea is the primary vector for cat-to-cat transmission.
  - *Ixodes* ticks may serve as *B. henselae* vectors, based on amplification of DNA from ticks, but replication of the organism and actual transmission by fleas or ticks to humans has not been proven.
- *B. bacilliformis* and *B. quintana* are vector-borne by sand flies and body lice respectively. Their non-human reservoirs are not yet identified.

**Blood Phase:**
- Intraerythrocytic bartonellae can be identified by a variety of methods in natural infections.
- *B. henselae* is found in endothelial cells and RBCs. Infected CD34+ hematopoietic progenitor cells give rise to infected RBCs in vitro and this, rather than attachment and invasion of mature RBCs, may be the source of intraerythrocytic bacteria.
- Occult bacteremia sometimes occurs.
Survival/Persistence in Blood Products:
• A spiking study suggests that B. henselae added to RBCs can be recovered on solid media through 35 days of storage at 4°C.

Transmission by Blood Transfusion:
• Theoretical
• Survival in stored RBCs and unconfirmed transmission by organ transplantation have been cited to raise concerns about transfusion transmission.

Cases/Frequency in Population:
• 22,000 cases of cat scratch disease per year estimated in the US
• 2-6% seroprevalence of B. henselae in US blood donors
• Cumulative seroprevalence of 7.1% to B. henselae and B. quintana in US veterinary professionals

Incubation Period:
• 3-10 days to appearance of papule at B. henselae inoculation site; regional adenopathy may follow after a few weeks

Likelihood of Clinical Disease:
• Cat scratch disease in normal hosts is relatively benign and self-limiting, lasting 6-12 weeks in the absence of antibiotic therapy.

Primary Disease Symptoms:
• B. henselae generally causes a mild infection at point of injury and lymphadenopathy involving the draining nodes, generally of the head, neck, and upper torso
  ◦ Fever, headache, fatigue, nausea and vomiting, sore throat, conjunctivitis (Parinaud's oculoglandular syndrome) and poor appetite also occur.
  ◦ Symptoms may be intermittent or chronic with a waxing and waning course.

Severity of Clinical Disease:
• More severe manifestations from B. henselae, bacillary angiomatosis or peliosis, and endocarditis, can occur in immune compromised hosts and are particularly well described complicating HIV infection.

Mortality:
• Unknown, but probably low

Chronic Carriage:
• Limited data to suggest the possibility of persistence in humans
• Persists in many animals, including cats

Treatment Available/Efficacious:
• Immunocompetent patients usually do not require treatment, but immunocompromised patients should be treated with macrolide antibiotics (erythromycin, azithromycin, or clarithromycin) or doxycycline.

Agent-Specific Screening Question(s):
• No specific question is in use.
• Not indicated because transfusion transmission has not been demonstrated
• No sensitive or specific question is feasible.

Laboratory Test(s) Available:
• No FDA-licensed blood donor screening test exists.
• Unlicensed IFA and PCR available
• In immunocompetent at-risk persons, diagnosis of the agent is enhanced by combining PCR with pre-enrichment culture.

Currently Recommended Donor Deferral Period:
• No FDA Guidance or AABB Standard exists.
• Prudent practice would be to defer donor until signs and symptoms are gone and any course of treatment is complete.

Impact on Blood Availability:
• Agent-specific screening question(s): Not applicable
• Laboratory test(s) available: Not applicable

Impact on Blood Safety:
• Agent-specific screening question(s): Not applicable
• Laboratory test(s) available: Not applicable

Leukoreduction Efficacy:
• Unknown, unlikely to affect intraerythrocytic organisms

Pathogen Reduction Efficacy for Plasma Derivatives:
• Specific data indicate that the multiple steps in the fractionation process are robust and capable of inactivating and/or removing bacteria at concentrations that may be present in plasma.

Other Prevention Measures:
• None

Suggested Reading: