TABLE 197-1 ***BARTONELLA*** **SPECIES KNOWN OR SUSPECTED TO BE HUMAN PATHOGENS**

Bartonella Species[a]	Disease[b]	Reservoir Host[c]	Arthropod Vector
B. henselae	Cat-scratch disease, bacillary angiomatosis, bacillary peliosis, bacteremia, endocarditis	Cats, other felines	Cat fleas (*Ctenocephalides felis*): associated with cat-to-cat, but not with cat-to-human, transmission
B. quintana	Trench fever, chronic bacteremia, bacillary angiomatosis, endocarditis	Humans	Human body lice (*Pediculus humanus corporis*)
B. bacilliformis	Carrión's disease	Humans	Sandflies (*Lutzomyia verrucarum*)
B. elizabethae	Endocarditis	Rats, dogs	Unknown
B. grahamii[d]	Lymphadenopathy	Mice, voles	Fleas
B. vinsonii subsp. *arupensis*	Endocarditis, febrile illness	Mice, dogs	Ticks
B. vinsonii subsp. *berkhoffii*	Endocarditis	Domestic dogs, coyotes, gray foxes	Ticks
B. washoensis	Myocarditis, meningitis	Squirrels, possibly other rodents	Fleas
B. alsatica	Endocarditis	Rabbits	Unknown
B. koehlerae	Endocarditis	Cats	Unknown
B. clarridgeiae	Possibly cat-scratch disease	Cats	Unknown
B. rochalimae	Bacteremia, fever, splenomegaly	Unknown	Possibly fleas
B. tamiae	Bacteremia, fever, myalgia, rash	Unknown	Unknown
Candidatus B. melophagi[e]	Various clinical manifestations	Unknown	Unknown
Candidatus B. mayotimonensis[e]	Endocarditis	Unknown	Unknown
Candidatus B. ancashi[e]	Verruga peruana–like illness	Unknown	Unknown

[a]Many other *Bartonella* species exist but are not recognized as human pathogens. [b]*B. henselae, B. vinsonii* subsp. *berkhoffii, B. koehlerae, Candidatus B. melophagi,* or more than one *Bartonella* spp. (co-infection) were detected in blood samples from patients with extensive arthropod and other animal exposure who presented with various chronic neurologic or neurocognitive syndromes. The role of these pathogens in these patients needs further study. [c]Animals are implicated when existing evidence supports their infection with *Bartonella* species. Data supporting animal-to-human transmission may be lacking. [d]Retinitis may also be associated with *B. grahamii.* [e]*Candidatus* is a taxonomic status for bacteria that cannot be described in sufficient detail to warrant establishment of a novel taxon or cannot be cultured or propagated in culture media. The phylogenetic relatedness of these bacteria has been determined by gene amplification and sequence analysis.

PATHOGENESIS

Inoculation of *B. henselae*, possibly via contaminated flea feces, usually results from a cat scratch or bite. Infection of mucous membranes or conjunctivae via droplets or licking may occur as well. With lymphatic drainage to one or more regional lymph nodes in immunocompetent hosts, a T_H1 response can result in necrotizing granulomatous lymphadenitis. Dendritic cells, along with their associated chemokines, play a role in the host inflammatory response and granuloma formation.

CLINICAL MANIFESTATIONS AND PROGNOSIS

Of patients with CSD, 85–90% have typical disease. The primary lesion, a small (0.3- to 1-cm) painless erythematous papule or pustule, develops at the inoculation site (usually the site of a scratch or a bite) within days to 2 weeks in about one-third to two-thirds of patients **(Fig. 197–1*A*, *B*)**. Lymphadenopathy develops 1–3 weeks or longer after cat contact. The affected lymph node(s) are enlarged and usually painful, sometimes have overlying erythema, and suppurate in 10–15% of cases **(Fig. 197–1*C*, *D*, and *E*)**. Axillary/epitrochlear nodes are most commonly involved; next in frequency are head/neck nodes and then inguinal/femoral nodes. Approximately 50% of patients have fever, malaise, and anorexia. A smaller proportion experience weight loss and night sweats mimicking the presentation of lymphoma. Fever is usually low-grade but infrequently rises to ≥39°C. Resolution is slow, requiring weeks (for fever, pain, and accompanying signs and symptoms) to months (for node shrinkage).

Atypical CSD occurs in 10–15% of patients as extranodal or complicated disease in the absence or presence of lymphadenopathy. Atypical disease includes Parinaud's oculoglandular syndrome (granulomatous conjunctivitis with ipsilateral preauricular lymphadenitis; Fig. 197–1*E*), granulomatous hepatitis/splenitis, neuroretinitis (often presenting as unilateral deterioration of vision; **Fig. 197–1*F***), and other ophthalmologic manifestations. In addition, neurologic involvement (encephalopathy, seizures, myelitis, radiculitis, cerebellitis, facial and other cranial or peripheral palsies), fever of unknown origin, debilitating myalgia, arthritis or arthralgia (affecting mostly women >20 years old), osteomyelitis (including multifocal disease), tendinitis, neuralgia, and dermatologic manifestations (including erythema nodosum **[see Fig. 25e-40]**, sometimes accompanying arthropathy) occur. Other manifestations and syndromes (pneumonitis, pleural effusion, idiopathic thrombocytopenic purpura, Henoch-Schönlein purpura, erythema multiforme **[see Fig. 25e-25]**, hypercalcemia, glomerulonephritis, myocarditis) have also been associated with CSD. In elderly patients (>60 years old), lymphadenopathy is more often absent but encephalitis and fever of unknown origin are more common than in younger patients. In immunocompetent individuals, CSD—whether typical or atypical—usually resolves without treatment and without sequelae. Lifelong immunity is the rule.

DIAGNOSIS

Routine laboratory tests usually yield normal or nonspecific results. Histopathology initially shows lymphoid hyperplasia and later demonstrates stellate granulomata with necrosis, coalescing microabscesses, and occasional multinucleated giant cells—findings that, although nonspecific, may narrow the differential diagnosis. Serologic testing (immunofluorescence or enzyme immunoassay) is the most commonly used laboratory diagnostic approach, with variable sensitivity and specificity. Seroconversion may take a few weeks. Other tests are of low sensitivity (culture, Warthin-Starry silver staining), of low specificity (cytology, histopathology), or of limited availability in routine diagnostic laboratories (polymerase chain reaction [PCR], immunohistochemistry). PCR of lymph node tissue, pus, or the primary inoculation lesion is highly sensitive and specific and is particularly useful for definitive and rapid diagnosis in seronegative patients.

APPROACH TO THE PATIENT: Cat-Scratch Disease

A history of cat contact, a primary inoculation lesion, and regional lymphadenopathy are highly suggestive of CSD. A characteristic clinical course and corroborative laboratory tests make the diagnosis very likely. Conversely, when acute- and convalescent-phase sera are negative (as is the case in 10–20% of CSD patients), when spontaneous regression of lymph node size does not occur, and particularly when constitutional symptoms persist, malignancy must be ruled out. Pyogenic lymphadenitis, mycobacterial infection, brucellosis, syphilis, tularemia, plague, toxoplasmosis, sporotrichosis, and histoplasmosis should also be considered. In clinically suspected CSD in a seronegative individual, fine-needle aspiration may be adequate and PCR can confirm the diagnosis. When data are