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## Case Report

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# *Borrelia burgdorferi* and *Babesia microti* Coinfection in a 79-Year-Old Camper

Russell A. Rawling, M.S., M (ASCP) SM, RM (NRM) SM,<sup>1</sup> Karen Strouse, MT (ASCP) SM,<sup>1</sup> and Paul A. Granato, Ph.D.,<sup>1,2</sup>

<sup>1</sup>Microbiology Section, Laboratory Alliance of Central New York, Liverpool, New York, <sup>2</sup>Department of Microbiology & Immunology, SUNY Upstate Medical University, Syracuse, New York

Lyme disease, human babesiosis, and human granulocytic ehrlichiosis are vector-borne diseases that are increasingly recognized as important pathogens in the northeast and upper midwestern regions of the United States (1-6). The etiologic agents of these human infections, *Borrelia burgdorferi*, *Babesia microti*, and *Anaplasma phagocytophilum*, respectively, are maintained in the same tick vector (*Ixodes scapularis* also known as *Ixodes dammini* or the deer tick) and the rodent reservoir (*Peromyscus leucopus*, the white-footed mouse). The definitive host of the tick vector is the white-tailed deer (*Odocoileus virginianus*). The proliferation of the deer populations in certain geographical areas of the U.S. during the mid-20th century has been the basis for the emergence of these infections (7).

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Mailing Address: Paul A. Granato, Ph.D., Department of Microbiology and Immunology, WH2204, SUNY Upstate Medical University, 750 East Adams St., Syracuse, NY 13210. Tel.: 315-464-7653. Fax: 315-464-4417. E-mail: [granatop@upstate.edu](mailto:granatop@upstate.edu)

Because *I. scapularis* serves as the tick-borne reservoir for *B. burgdorferi*, *B. microti*, and *A. phagocytophilum*, mixed infections with any two, or perhaps all three, of these agents are possible. In fact, in one study (8) of 93 patients with culture-proven Lyme disease, 2% of the patients were coinfecting with *B. microti* and another 2% were coinfecting with *A. phagocytophilum*. Other studies (9,10) have shown that up to 10% of patients may have *Borrelia* and *Babesia* coinfections. These coinfections may cause a confusing clinical picture, and some investigators have reported that coinfecting patients may have more severe or persistent illness (10,11).

This case report describes a 79-year-old patient who acquired a coinfection with *B. burgdorferi* and *B. microti* while on a 2-week family camping trip in Massachusetts.

### Case Report

A 79-year-old female patient presented to the emergency department with chief complaints of fatigue and weakness of greater than 3 weeks duration. On the morning of the patient's admis-

sion, she stood to walk but became weak and dizzy, which caused her to fall and hit her head. She did not lose consciousness. At the time of her evaluation in the emergency room, the patient had no headache, chest pain, or shortness of breath.

The patient's past medical history was unremarkable except that she had traveled to Massachusetts 6 weeks previously for a 2-week camping trip with her family. She had no memory of being bitten by a tick or insect and had no history of having a skin lesion resembling erythema migrans.

When she returned home, the patient began experiencing fatigue and weakness and subsequently developed a right-side facial droop. The patient was examined at a rural hospital near her home for evaluation of her facial droop to rule out stroke, but her CT scan at that time was negative. A provisional diagnosis of Bell's palsy was made, and the patient was started on steroid therapy. The patient's symptoms persisted and began to worsen when she was brought to our emergency room for evaluation after her fall at home.

The patient was admitted to the hospital, where subsequent laboratory tests showed that she was pancytopenic with significant anemia and had abnormal liver function tests and an elevated erythrocyte sedimentation rate. A hematology consultation indicated that the patient had hemolytic anemia, which was treated successfully with a transfusion of two units of whole blood.

Because of the patient's recent travel history to an area of endemicity for tick-borne diseases, an infectious disease consult was obtained. A blood sample was collected for serologic testing for Lyme disease, and a Wright-Giemsa stain was performed on thick and thin smears of peripheral blood to examine for protozoan parasites. Examination of the Wright-Giemsa-stained blood smears showed the presence of the classic intraerythrocytic Maltese cross structures that are diagnostic of babesiosis. In addition, by using an enzyme immunoassay (EIA) screening test, the serum sample tested positive for Lyme disease IgG/IgM antibody. A Western blot analysis (ARUP Laboratories, Salt Lake City, UT) also performed on this serum showed the presence of 23- and 41-kDa bands, thereby confirming that the patient was coinfecting with *B. burgdorferi*. The patient's babesiosis infection was treated orally for 7 days with 750 mg of atovaquone b.i.d. and 500 mg of azithromycin daily. Her Lyme disease was treated with a 21-day oral course of 100 mg of doxycycline b.i.d. The patient made an uneventful recovery and continues to do well.

## Discussion

Mixed infections with *B. burgdorferi* and *B. microti* are well documented (8-11). In Connecticut and Rhode Island, geographic areas of high endemicity, 10% of patients with Lyme disease are coinfecting with *B. microti* (9,10). Another study (12) showed that as many as 66% of randomly selected patients with Lyme disease from Long Island had antibabesia antibody.

Babesiosis usually presents as a subclinical or mild illness; however, occasional severe, life-threatening infections can occur in immunocompetent patients (13,14). The most severe infections occur in immunocompromised patients, particularly those who are asplenic. The highest incidence of babesiosis occurs

in adults over 70 years of age, with frequent clinical findings of irregular fever, chills, myalgia, and fatigue (15,16). Less commonly, patients present with hemolytic anemia, thrombocytopenia, elevated liver enzymes, and mild hepatosplenomegaly (15,17).

In patients with Lyme disease, 80% of the cases typically begin in the summer with the development of an expanding skin lesion known as erythema migrans. The lesion may be accompanied by systemic symptoms, including malaise, fatigue, fever, headache, arthralgias, myalgias, stiff neck, and, as was seen in our patient, facial droop or facial palsy. About 15% of patients may present with systemic symptoms but no history of erythema migrans (8).

The diagnosis of babesiosis is usually achieved by the detection of intraerythrocytic parasites in a Wright-Giemsa-stained peripheral blood smear. *Babesia* spp. are distinguished from the morphologically similar, but taxonomically different, *Plasmodium*-infected erythrocytes by observing smaller sized ring forms and the absence of pigment, schizonts, or gametocytes (18). The presence of the classic intraerythrocytic Maltese cross structure, as was seen in our patient's blood smear, confirms the diagnosis of babesiosis (19).

A two-step approach is recommended by the Association of State and Territorial Public Health Laboratory Directors and the CDC for establishing the serologic diagnosis of Lyme disease (20). Briefly, a patient's serum sample is screened for the presence of *B. burgdorferi* IgG/IgM antibodies by a sensitive EIA or immunofluorescence assay method. If this screening test is positive, a Western immunoblot assay is performed to detect antibodies specific to *B. burgdorferi* antigens. If present, the antibodies confirm the diagnosis of Lyme disease. Our patient had a confirmatory Western blot assay that detected antibodies to the 23- and 41-kDa antigens of *B. burgdorferi*.

## Summary

We report a case of a 79-year-old female patient who was coinfecting with *B. burgdorferi* and *B. microti* while on a family camping trip in Massachusetts. The diagnosis of babesiosis was established by detecting the characteristic

intraerythrocytic Maltese cross structures in a Wright-Giemsa-stained blood smear, whereas the diagnosis of Lyme disease was confirmed by using standard screening and confirmatory serologic methods. The patient was treated with the recommended drugs of choice for these infections and made an uneventful recovery.

The presence of coinfection with *B. microti* and *B. burgdorferi* was not suspected initially in our patient. Importantly, coinfections with these organisms may result in a more severe disease presentation, as was seen in our patient (10,11,17). This case report serves to remind clinicians and laboratorians that coinfections with these microorganisms are not uncommon and that all tick-borne zoonotic diseases must be considered in any patient who has a history of travel to an area of endemicity.

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