

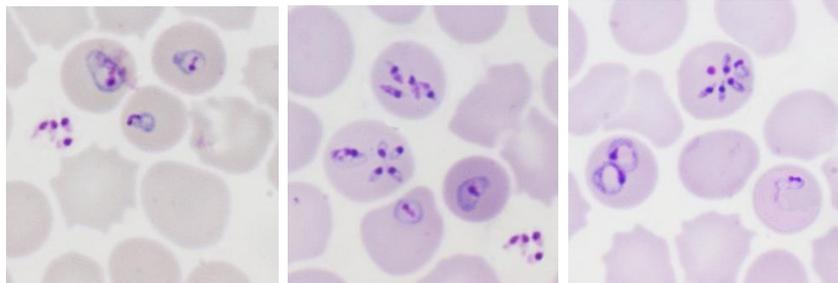
## PARASITOLOGY CASE HISTORY #2 (BLOOD PARASITES) (Lynne S. Garcia)

A 58-year-old male presented with a history of symptoms, beginning about 2 weeks before. These symptoms included general malaise, followed by fever, shaking chills, profuse sweating, arthralgias, myalgias, fatigue, and weakness. The man lived in rural Connecticut and owned property which had not yet been developed. He, his family, and three dogs went hiking on the property quite often.

Although they were aware of the presence of deer ticks, *Ixodes scapularis*, on the property, neither could remember seeing any ticks or being bitten. Initial tests did not confirm any particular infection or illness. Hepatosplenomegaly was present and the patient had slightly elevated bilirubin and transaminase levels as a result of hemolytic anemia.

The initial blood film examination was reported as negative (automated hematology instrument); however, after an additional 5 days, the following images were seen during microscopic review of thin blood films.

Please comment on the possible diagnosis.

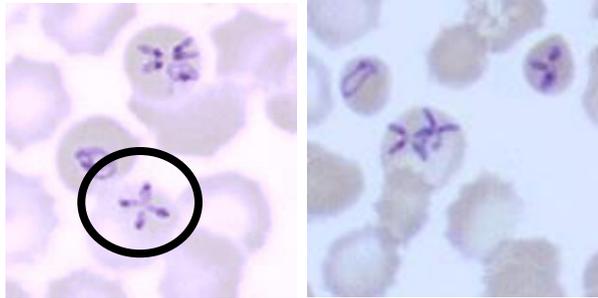


What infection most likely matches these images? Based on the images seen above why might there be some confusion regarding the identification?

### Answer and Discussion of Blood Parasite Quiz #2

The images presented in this quiz are the following: *Babesia* sp. (probably *microti*).

Note the key characteristics: multiple rings per RBC, very pleomorphic rings, some rings outside of the RBCs. Note, the typical Maltese Cross (four rings in the shape of a cross (see below) are not always seen in cases of *B. microti*.



### Comments on the Patient:

The patient had a *Babesia microti* infection transmitted by the bite of the deer tick, *Ixodes scapularis*. The parasites appear as pleomorphic, ring like structures. They can resemble the early forms of malarial parasites, particularly *P. falciparum*. In the middle image above, you can see the rings outside of the RBCs; this rarely occurs in a case of *P. falciparum* malaria. However, you can see there are many similarities between the *Babesia* ring like structures and the rings of *P. falciparum*. However, the *Babesia* parasites tend to be much more pleomorphic than those of malaria. Also, in cases of babesiosis, there may be five or six rings per cell, while in a case of *P. falciparum* malaria, generally two rings per cell tends to be more the case.

Note that the Maltese Cross configuration of four rings (seen in the left image above - circle) is less common in *B. microti* infections, the diagnosis of babesiosis can be made based on other factors, including parasite morphology.

### Clinical Disease:

***Babesia microti***. Most cases have been reported from seven states (Connecticut, Massachusetts, Minnesota, New Jersey, New York, Rhode Island, and Wisconsin). The incubation period may last from 1 to 9 weeks and clinical features are similar to those of malaria. The severity is variable depending on the immune status of the host, ranging from an asymptomatic infection to a severe life threatening disease. Severe disease generally occurs in patients over the age of 50 years or with splenectomy, malignancy, HIV, or immunosuppressive medication. Although headache and lethargy are common, babesiosis is rarely associated with specific neurological problems in humans. Diminished consciousness and/or coma are rare complications that are associated with severe and often fatal disease. Most patients with *B. microti* infections develop mild to moderate flu-like illnesses characterized by malaise and fatigue that include the following symptoms: rash, fever, chills, sweats, headache, arthralgia, myalgia, anorexia, cough, or nausea. Rarely, mild splenomegaly or hepatomegaly may be seen. Clinical symptoms may last for weeks to months, but rarely for more than a year.

Although many infections seen in the northeastern United States are subclinical, infections in California and Europe tend to present as a fulminant, febrile, hemolytic disease affecting splenectomized or immunosuppressed individuals. Any person with babesiosis acquired in Europe should be treated on an emergency basis. They should

receive prompt specific therapy to reduce parasitemia and to prevent extensive hemolysis and potential renal failure. A rapidly increasing parasitemia characterized by infections with *B. divergens* may require massive exchange transfusion. With the onset of hemoglobinuria, rapidly increasing intravascular hemolysis leads to renal failure.

Often, babesiosis can be managed with supportive care. Currently, the combination of clindamycin plus quinine has been recommended as the standard treatment regimen. However, failure to eliminate the infection in some immunocompromised patients has been reported. The use of azithromycin in combination with quinine may be considered as an alternative therapy.

### **Key Points - Laboratory Diagnosis**

1. Blood smears should be prepared upon admission of the patient.
2. Both thick and thin blood smears should be prepared. At least 200 to 300 oil immersion fields should be examined before the smears are considered negative (use the 100X oil immersion objective).
3. Wright's, Wright/Giemsa, Giemsa stain, or the rapid stains can be used. If the WBCs look acceptable, any parasites present will be well stained.
4. *Babesia* parasites may be missed using automated differential instruments. Even with technologist review of the smears, a light parasitemia is very likely to be missed.
5. There does not have to be any significant history of travel outside the United States. If organisms are seen, they will mimic *P. falciparum* rings.
6. No morphological stages other than ring forms will be seen. The classic arrangement of the four rings (Maltese cross) is not always seen, especially in infections with *B. microti*.
7. One negative set of blood smears does not rule out a *Babesia* infection.
8. Confirmation of morphologic differences between *Babesia* and malarial rings will usually require examination of stained blood films.

### **Epidemiology and Prevention:**

Prevention depends on the avoidance of ticks or their prompt removal once detected. Apparently, there are no fully effective tick repellents. If symptoms appear 1 to 2 weeks after a tick bite, a physician should be consulted. It is also well established that under blood banking conditions (4C for 30 days), *B. microti* can remain infective and that transfusion-acquired infection with this parasite could occur during the normal storage time for blood.

The most common approach used to protect humans from infection involves methods to reduce the tick density, including spraying of vegetation. Repellents can be helpful for personal protection; however, daily examination of the body surface of a person who may have come in contact with ticks is critical. If ticks are found, they should be removed immediately to take advantage of the lag time between attachment to the human and transmission of the infection (usually 50 to 60 hours).

## References:

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