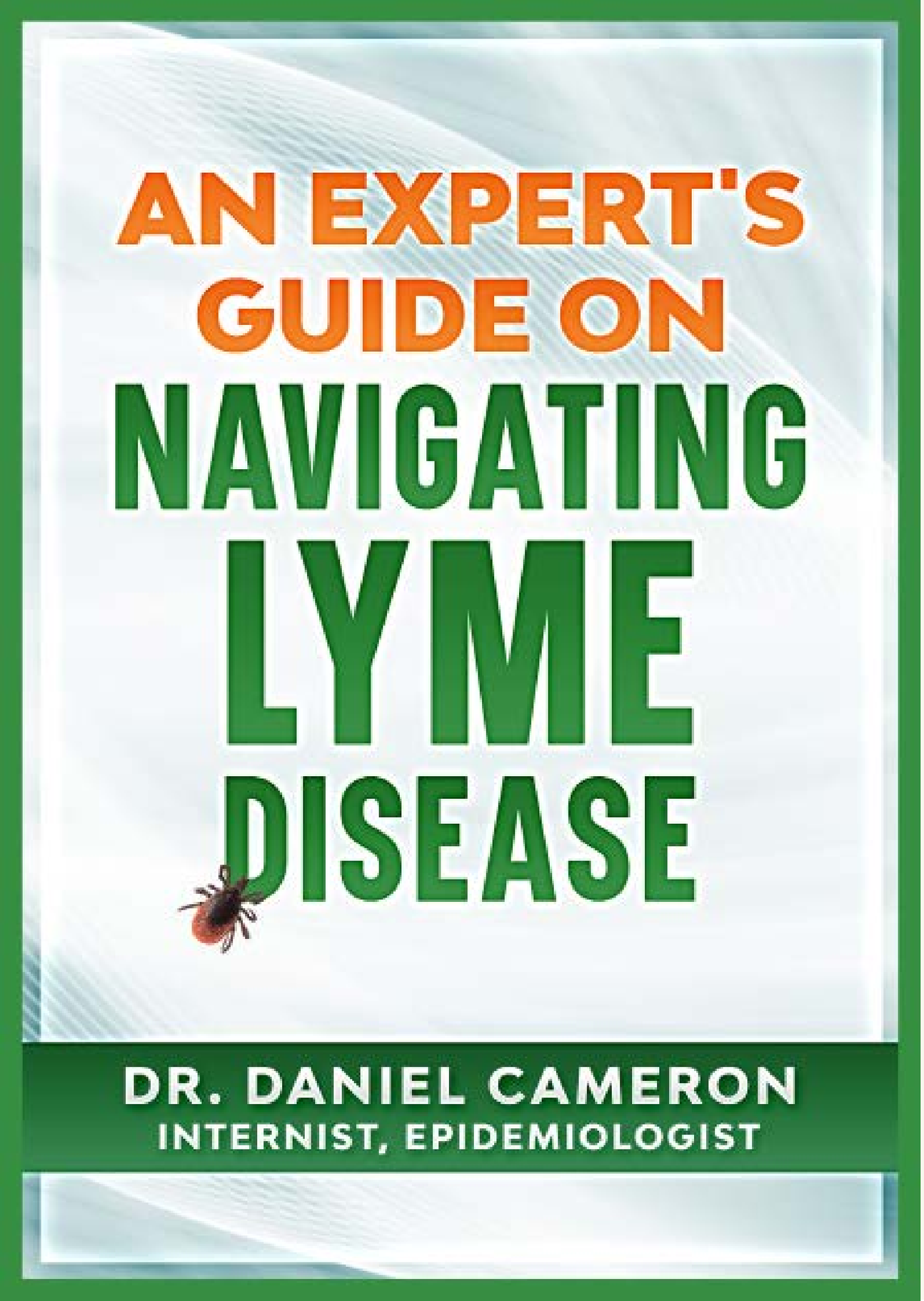

Babesia

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About the author

Dr. Daniel Cameron is a nationally renowned expert in diagnosing and treating Lyme and tick-borne diseases. He practices Internal Medicine in Mt. Kisco, New York—where he has helped patients for over 35 years. He's on a mission to ensure other health professionals and their patients navigate the diagnosis and treatment of Lyme disease.

Dr. Cameron holds a medical degree and masters degree in epidemiology from the University of Minnesota and completed residencies at Beth Israel Medical Center and Mt. Sinai Hospital in New York. He served two terms as president of the International Lyme and Associated Diseases Society (ILADS) and as lead author for their two evidence-based treatment guidelines.

Disclaimer

The author has cited and interpreted the published literature to provide information on Lyme and tick-borne illnesses. As new research and experience broaden our knowledge, the possibility of human error still exists. Thus, neither the author nor any other party preparing this book warrants information and are not responsible for errors, omissions, or the results obtained from the use of this information.

Professionals and patients should independently verify the data and interpretations discussed in this book. It is not intended as medical advice or guidance for patients and is not a substitute for individual patient assessment by a healthcare professional.

Introduction to Babesia

Babesia is a parasitic illness following a deer tick's bite that can increase Lyme disease severity. Babesia symptoms can be severe and deadly early in the disease when the parasites are visible in the red blood cells. However, Babesia symptoms can also be milder or absent in some individuals.

Doxycycline is not effective for Babesia. In contrast, treatment with an antiparasitic treatment can be effective, especially for Babesia chronic symptoms or sweats.

Topic 1

85-year-old man dies after sudden onset hearing loss

An avid gardener and golfer in good health except for hypertension, the man did not have a tick bite or rash. He was hospitalized with weakness and jaundice. Testing revealed mild anemia, a very low platelet count, mildly elevated bilirubin, and mildly reduced renal function (Javed et al., 2001).

Babesiawasdiagnosedbasedonabonemarrowbiopsy revealing intraerythrocytic inclusions (tetrads), typical of Babesiosis. In retrospect, his admitting blood from admission revealed parasitemia in 8% of the red blood cells. The Babesia antibody IgM and IgG were positive for Babesia (Javed et al., 2001).

His condition worsened despite treatment, subsequently developing bilateral pneumonia, renal failure, hepatic failure, and a coma. He was too ill to tolerate exchange transfusion and died within 60 hours of admission to the tertiary care center (Javed et al., 2001). Read more.

Topic 2

Babesia is more common than you think

"Studies in ticks, reservoir hosts, and humans indicate that coinfection with B. burgdorferi and B. microti is common, promotes transmission and emergence of B. microti in the enzootic cycle, and causes greater disease severity and duration in humans" Diuk-Wasser et al. 2016

What is particularly alarming is that the disease may recur and is transmissible via blood transfusions or congenitally. Additionally, Babesia requires different treatment than Lyme disease. Read more.

Topic 3

Babesia duncani is now in the Northeastern USA.

"Since B. duncani is widespread in Canada, its southern spread into the northeastern U.S., an area already endemic for Lyme disease, makes co-infections with B. duncani and B. burgdorferi [Lyme disease] a possibility that needs to be carefully investigated" (Parveen and Bhanot, 2019).

The authors raise concerns regarding treatment, given that "Antibiotics used against B. microti are less effective against B. duncani, making treatment.

"Clinical cases caused by Babesia duncani have been associated with high parasite burden, severe pathology, and death," wrote Abraham et al., 2018, in The Journal of Biological Chemistry. Read more.

Topic 4

Night-time sweats are not always present in Babesia

Sweats have been reported in patients with Babesia. This finding is no surprise given that Babesia is related to Malaria, a vector-borne disease known to cause sweats. Nearly half (46%) of the patients in a New England study, presented with a combination of Babesia and Lyme disease, reported having sweats (Krause et al. 1996.)

While sweats may help diagnose Babesia, it is not a reliable symptom, as sweats can be absent. In the Krause study, 42% of Babesia patients did not report sweats. Furthermore, sweats have been reported in other tick-borne illnesses, including Lyme disease and Anaplasmosis. Read more.

Topic 5

A woman with delayed onset Babesia

A study published in the British Medical Journal shows the importance of monitoring patients with Lyme disease after initial treatment, as coinfections can surface later (Hoversten and Bartlett, 2018).

Doctors diagnosed and treated a 67-year-old woman for early Lyme disease despite a 21-day course of antibiotics, after presenting with an erythema migrans rash.

Near the end of her treatment, she became ill. She was diagnosed with Babesia. The delayed diagnosis reinforces the need for follow-up of individuals treated for Lyme disease. Read more.

Topic 6

Babesia can increase Lyme disease severity

Babesia, a tick-borne infection causing malaria-like symptoms, has recently seen a spike in reported cases. Concerns are growing over the seriousness of the disease and its ability to be transmitted through the blood supply.

The first case of Babesiosis caused by the B. microti parasite was identified in 1969 in an individual who had vacationed in Massachusetts.

Babesia has since become a big problem due to its ability to increase the severity and duration of Lyme disease as well as its difficulty to diagnose. Read more.

Topic 7

Geriatric Babesia cases are rising

The number of Babesia cases among seniors in the U.S. appears to be growing. According to a study by Menis, published in the journal Open Forum Infectious Diseases, 19,469 Medicare beneficiaries had a Babesia diagnosis recorded between 2006 – 2017, with the highest rates occurring in babesiosis-endemic states (Menis et al., 2020).

Some patients with Geriatric Babesia require prolonged treatment, especially immunocompromised and elderly patients (Krause et al., 2008.

Topic 8

A misdiagnosed case of Babesia

A 72-year-old woman had a three-week history of a fever (maximum temperature, 104 F), chills, nausea, and productive cough of yellow sputum.

Her examination and tests were normal, except for pancytopenia and a manual peripheral blood smear showed Babesia microti in her red blood cells.

"The patient was started on azithromycin, atovaquone for Babesiosis, and doxycycline to treat Lyme disease with initial suspicion of co-infection and a plan to deescalate once Lyme disease was ruled out" (Bhesania et al., 2021).

She was discharged home with a combination of the three oral treatments. Read more.

Topic 9

How to diagnose Babesia

There are several tests to diagnose Lyme disease. In early disease, the parasite responsible for Babesia may be seen as a parasite in the red blood cell using peripheral blood smears.

Babesia can be detected later in the disease "using nucleic acid detection (polymerase chain reaction and transcription-mediated amplification), antigen detection, and antibody detection." (Bloch et al., 2019) The authors added, "Chronically infected blood donors may transmit the pathogen to another person through blood transfusion."

Block's team did not discuss the problems when the Babesia tests were negative. As a result, Babesia remains a clinical diagnosis for many. Read more.

Topic 10

‘Healthy’ people may be unaware they are infected with Babesia

A growing incidence of Babesia in New York state has been reported with blood donors unknowingly infected with the parasite, spreading the disease (Linden et al., 2018).

Nearly 3,800 cases of Babesia were reported in New York over 12 years. Fifty-five cases acquired Babesia via a blood transfusion from unknowingly infected donors. More than half of the recipients were over 60 years of age (Linden et al., 2018).

The donors discovered they were infected after these 55 individuals received their blood donation and became ill. Read more.

Topic 11

Doctors did not order tests for Babesia

Data collected from seven large commercial laboratories indicated that out of the nearly 3 million (2,978,881) specimens tested for tick-borne diseases (including Lyme disease), only 3% tested for Babesia. Furthermore, 85,323 Babesia tests were ordered compared to over 2 million (2,432,396) Lyme disease tests (Connally et al., 2016).

Identifying Babesia is crucial as antibiotic treatment differs from those prescribed for Lyme disease. “Doxycycline is the preferred oral treatment because it has activity against other tick-borne illnesses such as human granulocytic anaplasmosis, whereas the treatment for Babesiosis is a combination of atovaquone and azithromycin” (Curcio et al., 2016).

Author’s Note: The number of tests for Babesia may rise as doctors realize their importance. Read more.

Topic 12

Most Mayo clinic cases were symptomatic

Mayo Clinic physicians reviewed the clinical presentations and treatment approaches for 38 Upper Midwestern Babesia patients. Malaise was the most common symptom (84%) reported, followed by fever (71%), chills (52%), and joint pain (32%).

Sixty-eight percent of patients required hospitalization, with 21% admitted to the intensive care unit. Indications for ICU admission included: hemolytic anemia, shock requiring vasopressor support, and acute respiratory distress syndrome.

"Co-infection with Borrelia spp. or Anaplasma spp. resulted in increased severity of symptoms and a higher chance of hospitalization." Furthermore, 2 out of 3 patients were NOT immunocompromised. The authors estimated that 60% of children and 80% of adults were symptomatic (Fida et al., 2019). Read more.

Topic 13

A baby boy with Babesia

A 6-week-old baby boy was treated by an emergency department in Long Island, New York, a Lyme endemic area. The baby spent "minimal time outside" (Handel et al., 2019. The yard had tall grass, but the parents did not report seeing a tick. Instead, the parents removed a bloody "flea" from his arm 20 days before hospitalization.

The doctors prescribed three antibiotics – ampicillin, ceftriaxone, and vancomycin until they determined the cause of the illness.

The laboratory tests revealed that 3.6% of the baby's red cells showed parasites seen with Babesia.

The baby remained well on follow-up. Read more.

Topic 14

Longer treatment is needed for some Babesia patients

IDSA guidelines advise prolonged treatment for immunocompromised Babesia patients. “A subgroup of highly immunocompromised patients reported in a case-control study required at least six consecutive weeks of antibiotic therapy, including two final weeks during which parasites were no longer detected on peripheral blood smear ” (Krause et al., 2020).

Some patients may relapse. “A few cases of relapse despite at least 6 consecutive weeks of atovaquone plus azithromycin demonstrate that resistance to atovaquone and/or azithromycin can emerge in highly immunocompromised patients during an extended course of this antibiotic combination” (Krause et al., 2020). Read more.

Topic 15

Side effects of clindamycin and quinine

Mayo Clinic physicians reviewed the clinical presentations and treatment approaches for 38 Babesia patients (Fida et al., 2019).

- 68% of the patients were initially treated with azithromycin and atovaquone [Mepron]

- 32% received clindamycin and quinine or quinidine. However, due to the side effects associated with quinine, most patients were switched to azithromycin and atovaquone

Lastly, three severely ill patients received an exchange transfusion. One patient was treated for six months due to “persistently positive blood smears” and was also co-infected with Lyme disease and had a previous splenectomy for leukemia (Fida et al., 2019). Read more.

Topic 16

Co-infections may make a Lyme infection worse

A study found that out of nearly 3 million specimens, only 17% were tested for non-Lyme tick-borne diseases (Connally et al. 2016). Determining whether or not other vector-borne diseases are present is key to a person's recovery. Lyme disease patients with co-infections experience a greater number of symptoms for a prolonged time than those with Lyme disease alone (Krause et al., 1996).

Co-infections can impact the patient's treatment since antibiotic therapies prescribed for Lyme disease may not be effective against parasitic or viral diseases (Moutailler 2016). For example, doxycycline is ineffective in treating Babesia, but a combination of azithromycin and atovaquone is beneficial (Krause et al., 1996). Read more.

Topic 17

Lyme disease may be dismissed as perimenopausal symptoms

A perimenopausal individual can present with symptoms similar to those with Lyme disease, including disrupted sleep (with or without associated night sweats), depression and cognitive difficulties, fatigue, joint pain, and hot flashes (vasomotor symptoms).

It can be tricky to diagnose Lyme disease without a tick bite, bulls-eye rash, Lyme arthritis, or heart block. The diagnosis may be more difficult in a patient with Babesia. Babesia is a parasite in the same tick that causes Lyme disease, which can lead to sweats. In some cases, the sweats associated with Babesia followed the onset of perimenopause. Therefore, diagnosing Babesia in a woman entering menopause is a diagnostic challenge unless they present with intracellular Babesia parasites.

Topic 18

A Babesia parasite in a red blood cell

Acute onset Babesia can be seen on microscopic examination of Wright or Giemsa-stained thin blood film. “Babesia and Plasmodium falciparum are morphologically similar on microscopic examination. Features that help to discriminate between the two include the lack of hemozoin pigment deposits and the presence of tetrad or “Maltese cross” forms in Babesia-infected erythrocytes” (Bloch et al., 2019). The intracellular findings of Babesia can clear only to reappear later, especially in immunocompromised patients.

Bloch et al., 2019 included pictures of Giemsa-stained thin blood films showing Babesia microti parasites. Polymerase chain reaction (PCR) and antibody tests may be positive even in individuals with a negative blood smear. Yet, some patients with Babesia do not have a positive test. Other patients find out they have Babesia after donating blood when their recipient develops Babesia. Read more or view images of intracellular Babesia microti parasites.

Topic 19

Microscopic, PCR, or antibody tests

Evidence of Babesia, Anaplasmosis, and Ehrlichia have been seen on microscopy in some individuals early in the disease.

The PCR test may be positive early in the disease, but sadly, the PCR test has often been negative due to interference with other DNA in the body.

The IgM antibody tests may be positive early in the disease, but the IgG antibody test may be positive later.

Regrettably, none of the tests may be positive. The doctor must then make a clinical decision to treat or not.

Topic 20

Treatment options for Babesia

The following treatments for Babesia have been well studied.

- Atovaquone combined with azithromycin
- Quinine combined with clindamycin

Other treatments for Babesia are infrequently studied.

- Artemisia
- Artemether / Lumefantrine

Brand names in the U.S. for these medications include:

- Mepron (atovaquone)
- Malarone (atovaquone with proguanil)
- Coartem for Artemether / Lumefantrine.

Topic 21

First-line combination therapy for Lyme

Typically, doxycycline is the go-to antibiotic for practitioners. It has become the favorite first-line drug for treating tick-borne illnesses, but it's not effective for all tick-related diseases (i.e., Babesia). In these instances, a combination of antibiotics and/or anti-viral medications may be required.

Paparone and Paparone, (2018) discussed the various presentations of Babesia and the treatment plans for five patients in the journal Nurse Practitioner. Four of the five individuals were treated with doxycycline concurrently for the possibility of anaplasmosis. Read more.

Topic 22

Combination antibiotics four-drug regimen case

A 35-year-old man was diagnosed with Babesia, with 8.5% of his blood showing the parasite. He had been diagnosed with granulomatosis with polyangiitis in 2001. He was considered immunocompromised related to treatment two years earlier with rituximab, a monoclonal antibody used for immunotherapy. He also took methotrexate, cyclophosphamide, and steroids.

He was treated four times for relapsing Babesia. “His treatment included a four-drug regimen that included azithromycin, clindamycin orally atovaquone, and Malarone® [which contains atovaquone] drug therapy for 41 days” (Marcos et al., 2022). He was also treated with Tafenoquine, an 8-aminoquinoline primaquine analog approved by the F.D.A. for prophylaxis of Malaria and prevention of relapse of Plasmodium vivax Malaria. In animal models, Tafenoquine could clear Babesia microti parasites rapidly (Marcos et al. 2022). Read more.

Topic 23

Babesia is in the blood supply

A 2003 study discussed concerns with Babesia in the blood supply. “Parasitemia in humans is transient and episodic. For this reason, there is a risk of asymptomatic donors transmitting the disease to recipients.” The authors raised concerns that there were 20 cases of Babesiosis and a variant Babesia strain called WA1 by red blood cells and blood component transfusions by 2003 (Setty et al., 2003). Read more.

Topic 24

Reports of transfusion-transmitted Babesia

Transfusion-transmitted babesiosis (TTB) cases have been reported in Maryland, South Carolina, and Nebraska and “serve as a reminder of the potential for TTB, especially in states not endemic for Babesia,” cautions LeBel II and colleagues (2017) from the Department of Pathology and Laboratory Medicine at the Medical University of South Carolina.

Two asymptomatic patients living in nonendemic regions (South Carolina and Maryland) highlight the difficulties of identifying Babesia in the blood supply by simply tracing the donors (LeBel et al., 2017).

“Blood products collected in Babesia endemic areas are distributed nationally thus, clinicians in non-endemic states may fail to include babesiosis in the differential diagnosis of a patient who had a recent transfusion history and a fever of unknown origin,” LeBel II explains. Read more.

Topic 25

Congenital transmission of Babesia to a 5-year-old twin

A baby girl was born to a mother who showed no evidence of Lyme or a related tickborne illness during her pregnancy (Walker et al., 2022). The five-week-old female diamniotic dichorionic twin was born at 36 5/7 weeks by C-section and diagnosed with Babesia. Her twin brother was asymptomatic.

The mother described several trips to Cape Cod, Massachusetts, an area endemic to Lyme disease. “The patient’s mother had one febrile illness during pregnancy, occurring at approximately 23-24 weeks of gestation, associated with a maculopapular rash that resolved spontaneously” (Walter et al., 2022).

The daughter was treated with a blood transfusion, intravenous atovaquone twice daily, and azithromycin daily. The authors of the article pictured a blood smear with intraerythrocytic inclusions consistent with Babesia microti. Read more.

Topic 26

Three premature infants with Babesia from a single donor

A team of Yale School of Medicine researchers described three premature infants — all in one neonatal intensive care unit — who contracted Babesia from a single 24-year-old blood donor. The report was published in the Pediatric Infectious Diseases Journal (Glanternik et al., 2017).

The 24-year-old donor from Connecticut was not recognized by the blood bank and "was deemed suitable for donation by the American Red Cross, and his serology was negative for all FDA-mandated tests."

Three premature infants contracted Babesia from this donor, with two of the infants developing high-grade parasitemia (presence of parasites in the blood). Parasitemia rose to 13.4% and 12.5% for Infants A and B, respectively. Parasitemia peaked at 6.8% for Infant C (Glanternik et al., 2017).

All three premature infants were treated with a combination of azithromycin and atovaquone instead of published recommendations for clindamycin and quinine. "The stability of oral suspension [of quinine] using capsules is undetermined," explains Glanternik. "Furthermore, quinine's narrow therapeutic index and potential adverse effects limit its utility in treating small children."

The infants were treated for 14 days — longer than the 7-10-day recommendation described in the (IDSA) guidelines.

Unfortunately, 48 days after treatment, one of the infants relapsed. The infant was treated with another 23 days of a combination of azithromycin and atovaquon. Read more.

Topic 27

Two mothers transmit Lyme to their babies

Babesia can be contracted from the bite of a deer tick, a blood transfusion, or during pregnancy. A podcast shares a case of how Babesia was transmitted from mothers to their babies during pregnancy.

Questions raised in the podcast include:

- How often do mothers contract Babesia from a tick bite during pregnancy?
- Is there an effective and safe treatment for Babesia in pregnant women?
- How does a mother or doctor recognize Babesia in a pregnant mother?
- Should doctors follow pregnant mothers with a tick bite or Lyme disease for Babesia and what evidence should be investigated?
- Will the mothers develop complications of Babesia in the future if not treated?
- Should the two mothers have been treated for Babesia?

Topic 28

Delayed onset Babesia in two newborns

A study from the Mayo clinic described two newborn infants diagnosed with Babesia several weeks after the mothers were treated for Lyme disease (Hoversten and Bartlett, 2018).

Infant 1:

A baby boy was diagnosed with Babesia at four 1/2-week. His mother had been diagnosed and treated for early Lyme disease at 32 weeks gestation.

Infant 2:

A baby girl was diagnosed with Babesias at 18-day-old. Her mother had been diagnosed and treated for early Lyme disease at 37 weeks gestation.

Neither mother were treated for Babesia during the pregnancy. Read more.

Book readings and discussions

Dr. Cameron has recorded a series of book readings and discussions to expand on his book. Check out his readings and discussions.

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