

Congenital Transmission of Erythema Migrans or Lyme Disease, Myth or Reality?

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Abstract

Lyme disease or Erythema Migrans, described many years ago, and previously known under the name of Lyme Juvenile Arthritis, is produced by a *spirochete* transmitted by the bite of a family tick. *Ixodidae*, *Ixodes scapularis* and many others; discovered by the scientist Willy Burgdorfer in the year of 1981, being named *Borrelia Burgdorferi*, in honor of its discoverer. Apart from the numerous cutaneous and organic manifestations attributed to *Borrelia*, it is nowadays discussed in the scientific field if it is capable of cross the placenta and cause fetal damage. In this review we will show you that this biological agent, as in syphilis, produced by *Treponema Pallidum*, another spirochete, crosses the placenta and can produce serious consequences to the fetus, including death.

Keywords: Lyme disease; *Borrelia burgdorferi*; congenital lyme; fetal damage; pregnancy

Main objective

The main objective of this work is to demonstrate that Lyme disease and their biological agent, spirochete *Borrelia Burgdorferi* is not only an illness with cutaneous manifestations. It can cross the placenta during pregnancy and produce fetal damage that in severe cases can cause death in newborns.

Secondary objectives

- Describe the clinical manifestations in children born from positive Lyme mothers who did not receive treatment in pregnancy, or in those who received treatment with resistance to it.
- Alert the World community that there is indeed transplacental transmission of *Borrelia Burgdorferi* in pregnant Lyme positive women and if there is not adequate treated in time, both the mother and fetus can present clinical symptoms ranging from mild, to severe, even stillbirth.
- To call attention to the World Health Organization so that in the revision of the international codes of diseases (ICD-11), this year 2018, the code "Congenital Lyme" be included in them.

Introduction

The Center for Disease Control and Prevention (CDC) affirms in its website that the pregnant woman Lyme positive when making her treatment, the child will be born healthy and recommends for this, the use of the antibiotic amoxicillin or cefuroxime, because doxycycline, which is the antibiotic of choice, can cause damage to the developing fetus^[1].

Other antibiotics recommended by the CDC are the macrolides azithromycin, clarithromycin or erythromycin in case of allergy or intolerance to those previously mentioned^[2].

The CDC itself recognizes that Lyme disease and its causative agent *Borrelia Burgdorferi* can cross the placenta and cause stillbirths^[1,2].

The question here is what would happen if the *Borrelia* species, as in some cases, is resistant to amoxicillin or another antibiotic, or the antibiotic to which *Borrelia* is sensitive cannot be indicated because it would harm the fetus? And beyond, if the patient does not receive the treatment by omission or carelessness^[3].

As we said previously the *Borrelia Burgdorferi* was discovered by Willy Burgdorfer in the year 1981, and just two (2) year later, in 1983 the first study was published by Shirts SR,

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and Brown MS, Bobitt Jr, where it is suspected that this spirochete can cross the placenta^[4].

After this study began to appear others, who definitely showed that this spirochete is able to cross the placenta and cause fetal damage, of which we will present in chronological order the most important and confirm the above said.

Chronological Evolution

1983: The first suspicion described that ante partum fever may be caused by the *Borrelia Burgdorferi* species, was made in 1983 in two febrile pregnant women in the third-trimester. The two newborn survived, but the scientists suggested the establishment of early laboratory tests to identify the causative agent and the establishment of a rapid treatment to avoid future complications in the pregnant and the fetus^[4].

1985: Really, the first study describing the maternal-fetal transmission of Lyme disease, *Borrelia Burgdorferi* was published in 1985 by Schlesinger PA, Duray PH, Burke BA, Steere AC, and Stillman MT., Where they describe a case of a pregnant woman who acquired Lyme *Borreliosis* and did not receive treatment with antibiotics. The child was born at 35 weeks of pregnancy and died of congenital heart disease the first week of life. The autopsy revealed the *Borrelia Burgdorferi* spirochete in the spleen, kidneys and bone marrow^[5].

1986-1989: In the year 1986, MacDonald A.B, describes 4 cases of abortions in pregnant women who tested positive for Lyme, and in whose fetuses the *Borrelia Burgdorferi* was found in their tissues. This same author does another work in 1989 about Lyme disease and its implications for the fetus and describes side effects such as fetal death, hydrocephalus, cardiovascular abnormalities, neonatal respiratory distress, hyperbilirubinemia, intrauterine growth retardation, cortical blindness, sudden death syndrome of the infant and maternal toxemia of pregnancy, and raises the similarity of these with neonatal syphilis^[6,7].

1987: Later, the same Willy Burgdorfer the discoverer of the *Borrelia Burgdorferi*, together with Dr. Alan Mc Donald and Jorge Benach PhD, published in year 1987 (31 years ago) a work where they relate this disease in children born dead associated in pregnant Lyme positive.

Among the highlights are description of congenital malformations, fetal death, and cardiac anomalies; also alert the scientific community to investigate exposure during the first trimester of pregnancy in the presence of *Borrelia Burgdorferi*; and in these cases to determine if cardiac organogenesis is complete by the end of the first trimester of pregnancy. They also recommend starting treatment with Penicillin at the same dose of syphilis in those cases of pregnant women who show signs and early symptoms of the disease^[8,9].

1988-2012: In these 24 years a total of more than 80 papers were published where Lyme disease is effectively related to pregnancy with fetal damage, studies done in the countries: United States, Canada, Hungary, Germany, Italy, Switzerland, Africa, Turkey, Czech Republic, Poland and Belgrade former Yugoslavia, and others^[10-52].

Another study that is worth noting is that carried out by

the updated MEDLINE database for the year of July 2012, the last revision of November 2012 of 88 journal articles from the PUBMED database, which we summarize in this way.

Maternal-Fetal transmission of lyme disease (Results):

Mothers with active Lyme disease, treated: 14.6% of pregnancies resulted in sequel.

Mothers with active Lyme disease not treated: 66.7% of pregnancies resulted in sequel.

Positive Lyme mothers, the treatment is unknown: 30.3% resulted in sequel.

Specific adverse results included:

Cardiac 22.7%,

Neurological 15.2%,

Orthopedic 12.1%,

Ophthalmologic 4.5%,

Genitourinary 10.6%,

Miscellaneous anomalies 12.1%^[53].

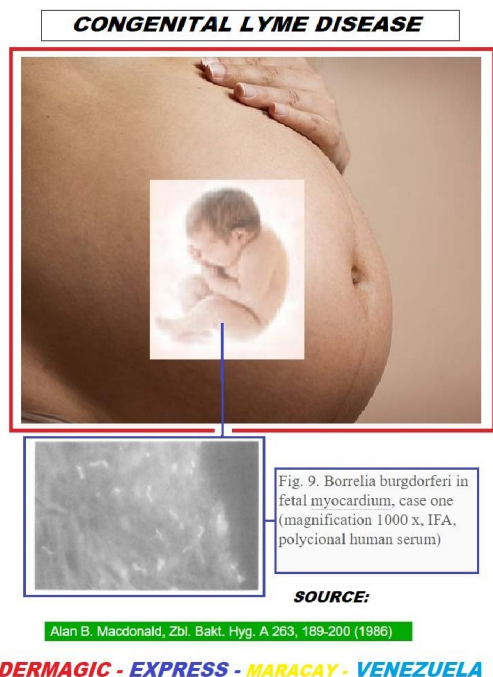
Now we will put a summary of the most frequent clinical manifestations described in a study of more than 100 children born to mothers with LYME positive disease, conducted in the year 2005.

Common signs and symptoms in lyme positive children: Low grade fever: 59% -60%; Fatigue and lack of resistance: 72%; Nocturnal sweating: 23%; Pale, dark circle under the eyes: 42%; Abdominal pain: 20-29%; Diarrhea or constipation: 32%; Nausea: 23%; Cardiac anomalies: 23%: palpitations / PVC, heart murmur, mitral valve prolapse. ; Orthopedic disorders: sensitivity (55%); pain (69%) spasms and generalized muscle pain (69%); rigidity and / or retarded motion (23%); Respiratory infections of the superior tract and otitis: 40%; Arthritic disorders and painful joints: 6% -50-%; Neurological disorders: Headaches: 50%, Irritability: 54%, Bad memory: 39%; Delay in development: 18%; Seizure disorder: 11%; Vertigo: 30%; Tic disorders: 14%; Involuntary athetoid movements: 9%.; Earning disorders and humor changes: 80%: Cognitive speaking: 27%, Speech delay: 21%, Reading-writing problems: 19%, Problems of vocal articulation: 17%, Auditory / visual processing problems: 13%, Word selection problems: 12%, Dyslexia: 8%; Suicidal thoughts: 7%; Anxiety: 21%; Anger or rage: 23%; Aggression or; violence: 13%; Irritability: 54% - 80%; Emotional disorders: 13%; Depression: 13%; Hyperactivity: 36%; Photophobia: 40-43%; Gastro esophageal reflux with vomiting and coughing: 40%; Secondary eruptions: 23%; other eruptions: 45%; Cavernous haemangioma: 30%; Ocular problems: posterior cataracts, myopia, stigmatism, conjunctive erythema (Lyme eyes), optical nerve atrophy and / of uveitis: 30%; Sensitivity of skin and noise (hyperacuity): 36 - 40%; Autism: (9%)^[41].

2013-2018: In recent years the number of cases of Lyme disease has increased notably in North America, Europe, Asia and Africa; in the United States and Canada, it is the most commonly transmitted vector-borne disease reported today^[54-62].

For the year 2017 the World Health Organization (WHO) in charge of "coding" diseases through the ICD-10 (International Classification of Diseases year 2017), had not yet included and recognized the code "Congenital Lyme". It is ex-

pected for this year 2018 that all codes of Lyme disease will be recognized by this organization^[63-68].



You can read this classification and codes here:

[Understanding Lyme disease classification and codes^{\[69\]}](#).

We must remember that *Borrelia* has been studied phylogenetically and numerous variations of it have been described, finding 21 genospecies of *Borrelia Burgdorferi* according to human sensitivity.

10 species of them with pathogenicity known to humans whose group includes:

B. afzelii, *B. bavariensis*, *B. bissettii*, *B. burgdorferi sensu stricto*, *B. garinii*, *B. kurtenbachii*, *B. lusitaniae*, *B. mayonii*, *B. spielmanii* and *B. valaisiana*.

11 identified species that have not yet been detected or isolated from humans. This group includes *B. americana*, *B. andersonii*, *B. californiensis*, *B. carolinensis*, *B. chilensis*, *B. finlandensis*, *B. japonica*, *B. tanukii*, *B. turdi*, *B. sinica* and *B. yangtze*.

Borrelia Burgdorferi circulates predominantly in the United States, and *Borrelia Afzelli* and *Borrelia garinii* in Europe and Asia.

Regardless of the genospecies involved with pathogenicity demonstrated in humans, all the studies presented show that *Borrelia*, being a spirochete like the *Treponema Pallidum* causal agent of syphilis, is able to cross the placenta and conquer the fetus, if the positive Lyme pregnant woman is not treated in time^[70-75].

Endosymbiosis

A new aspect to consider in the transmission of bacteria to its hosts is the term Endosymbiosis, which comes from the Greek endon “within”, syn “together”, and biosis “living”. Any organism that lives inside the body or cells of another organism in a symbiotic relationship with the host’s body or cell is defined as an endosymbiont organism, often, but not always, for the benefit of both.

This event has been demonstrated in the year 2018 in the female *Ixodes Ricinus* tick which present the Gram-Negative bacteria *Mitochondrium Midichloria* present in the mitochondria in various ovarian cells and they have a high rate of seroprevalence in individuals exposed to ticks. This fact raises the probability that non-pathogenic endosymbionts can play an important role in the immune response and transmission of the spirochete *Borrelia* by ticks.

This fact would explain why some species of ticks have greater power of infestation than others, the presence of endosymbiont organisms in their cells that predispose them to be more pathogenic than others, more likely to reach the fetus in some instances.

Conclusions

- Lyme disease is caused by the bite of a tick transmitted by the *Borrelia Burgdorferi* spirochete, discovered by Willy Burgdorfer in the year 1981. Initially, skin, joint and cardiac manifestations were described in those affected, but not in pregnant women or the fetus.
 - Two years later, in 1983, was described the suspicion of infection in pregnant women, and in 1985 it was found the first clinical manifestations in pregnant women and fetuses, highlighting congenital malformations and fetal death.
 - We demonstrate scientifically that definitely Lyme disease, in addition to its multiple organic manifestations, its causative agent *Borrelia Burgdorferi*, crosses the placenta and reaches the fetus in pregnant women, producing the side effects already described, regardless of the species involved, with proven pathogenicity in humans.
 - All pregnant women living in endemic areas of Lyme disease should take the tests to rule out *Borreliosis* of pregnancy, to establish immediate treatment in case of being positive.
- In addition to establishing adequate treatment, we alert the population to defend against the bite of possibly infected ticks.
- We urge the World Health Organization to recognize all the codes and classification of Lyme disease in ICD-11 (International Classification of Diseases year 2018).

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