## Pregnancy and Lyme Disease

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The bacteria that causes Lyme disease, *Borrelia burgdorferi,* is most commonly transmitted to humans through the bite of an infected tick; however, transmission in pregnancy from mother to baby is also possible, having been reported in both animals and humans. The U.S. Centers for Disease Control and Prevention, the Public Health Agency of Canada, and the National Institutes of Health acknowledge this alternative route of transmission. Although congenital infection is currently considered rare, the true frequency and range of potential adverse early and late clinical manifestations of this mode of transmission in children remains understudied and not yet fully defined.

Prompt diagnosis and treatment of Lyme disease during pregnancy are generally associated with favorable pregnancy outcomes and healthy infants.[1] A Lyme disease diagnosis can be challenging as signs and symptoms of an acute Lyme infection during pregnancy may be less pronounced [2] and as with Lyme disease in general, an erythema migrans rash may not be present or detected. Significant knowledge gaps remain regarding how Lyme disease impacts pregnancy in cases of chronic or subclinical illness.

Adverse pregnancy outcomes reported with gestational Lyme disease include vaginal bleeding, pre-eclampsia, placental abruption, infant prematurity, miscarriage and stillbirth. In gestationally exposed children, a wide variety of health effects have been described including neonatal hyperbilirubinemia (jaundice), cardiac and neurologic disease, along with skin, joint and eye involvement; however, a consistent pattern of adverse outcomes or a specific congenital syndrome has not yet been established. Similar to other infections with known congenital transmission (e.g. syphilis, Chagas disease), it is possible that signs and symptoms of congenitally acquired Lyme disease may be delayed, arising months to years after birth.[3]

Any concerns of Lyme disease during pregnancy should be addressed with a Lyme-knowledgeable healthcare practitioner to provide careful clinical assessment and long-term follow-up for both mother and baby. While research gaps and questions remain in our clinical understanding of the impact of Lyme disease and pregnancy, the issue is gaining renewed attention. A recent publication on the subject matter provides recommendations for further research in the field.[3]

## Pregnancy and Lyme Disease References

1 Waddell et al. A systematic review on the impact of gestational Lyme disease in humans on the fetus and newborn. PLoS One. 2018 Nov 12;13(11):e0207067. doi: 10.1371/journal.pone.0207067.
2 Maraspin et al. Course and Outcome of Erythema Migrans in Pregnant Women. J Clin Med. 2020 Jul 24;9(8):2364. doi: 10.3390/jcm9082364.
3 Faber et al. Perinatal transmission of *Borrelia burgdorferi*: advancing scientific and clinical understanding of Lyme disease in pregnancy. Front. Med. 2026 13:1794120. doi: 10.3389/fmed.2026.1794120.

## Involvement of the Nervous System in Lyme Disease

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The nervous system is frequently affected by Lyme disease. Both the central and peripheral nervous systems are at risk. Frequently, patients with Lyme disease develop an encephalopathy resulting in learning disabilities, difficulties with attention span, memory and word finding, and the patients complain of headache. Acutely, a person may also have a Lyme meningitis with inflammation of the covering over the brain and spinal cord. They may have an inflammation of the brain itself called encephalitis. Nerves can be involved, such as the 7th nerve causing a facial palsy, or peripheral nerves causing neuropathy with sensory changes and weakness. There have been rare cases of stroke, and patients may have seizures with Lyme disease. In children, we can also see increased pressure in the nervous system called pseudo tumor. This also results in headaches and may also affect vision. The muscles may be involved and this can cause weakness and pain.

Some diagnostic tests that may be helpful in evaluating the nervous system include an MRI of the brain, EEG, spinal tap, EMG's and nerve conduction studies.

In addition to treating the Lyme disease with appropriate antibiotic therapy, medications may have to be given to help relieve some of the symptoms and the discomfort that patients have as a result of involvement of the nervous system. They mayrequire anti-convulsants for seizures, diuretics to decrease the intracranial pressure, analgesics for pain, appropriate education intervention if there are learning problems, and physical therapy for weakness.

It is important for physicians and patients to recognize how frequently the central and peripheral nervous systems may be involved in Lyme disease.

## Neuropsychiatric Effects of Lyme Disease on Children and Adolescents

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Children with Lyme disease may develop neuropsychiatric symptoms affecting mood, thinking, and behavior. The infection itself may have direct effects on the brain or indirect effects through the activation of the immune system which produces substances which affect the brain. For example, marked fatigue would result in trouble paying attention or staying awake in class as well as struggles with parents about getting to school on time.

Common psychiatric presentations in younger children include irritability and increased separation, anxiety or other fears. In older children, mood swings and anxiety attacks are more common. Less frequently, children may develop new onset motor or vocal tics, obsessive compulsive disorder, or rarely an encephalitis with behavioral regression that looks very much like an autistic spectrum disorder.

Common cognitive problems include trouble with visual and auditory attention and slower mental processing speed. Children with unrecognized Lyme disease may be misdiagnosed as having primary attention deficit disorder – a mistake that not only results in unnecessary school problems for the child but also may allow a treatable acute infection to become a more entrenched chronic one. For example, these children may have trouble directing or maintaining focus on what the teacher says in class or storing into memory what he/she reads. The decline in school performance alarms parents and may result in a lowering of the child's self-esteem such that he/she feels stupid - until the cause is identified. Neuropsychological testing may reveal that the child's IQ has declined considerably, with the performance subtests more heavily affected than the verbal subtests. School systems must make special accommodations for these medically-disabled children.

As an adjunct to the medical work-up of these children, brain SPECT scans can be helpful in differentiating primary psychiatric disorders from the secondary neuropsychiatric effects of a diffused brain illness such as Lyme disease.

## A Parent's Guide to Understanding the Visual Consequences of Lyme Disease

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Lyme disease affects visual processing in the brain yet symptoms are often mistaken for other problems associated with functional ocular disorders, balance and movement disorders and cognitive dysfunction. When a child is infected, often they experience symptoms including blurring, double vision (diplopia), photophobia, distortion of space, visual strain and headaches when performing near vision activities, difficulty with balance, dizziness, convergence and focusing difficulty.

Standard eye exams may show difficulties with convergence and accommodation (focus of the eyes), which can occur without Lyme disease. This often causes doctors to try and treat the convergence and/or focusing problems with vision therapy rather than understand that these are characteristics of a visual processing dysfunction in the brain caused by Lyme related disease.

Recent research has found a biomarker using visual evoked potentials (VEP), demonstrating that Lyme-related disease causes dysfunction with spatial visual process in the brain, which causes a balance interference between two visual processes in the brain, causing the functional vision difficulties. A compromise to the spatial visual process causes the child's vision to isolate on detail. Reading is no longer fluent. Instead of the spatial visual process seeing the shape of several words before the higher process sees the letters, the child begins to see the words as isolated details of letters–'focal binding'–producing intensity within the visual process that interferes with comprehension, memory and produces fatigue, headaches and visual fatigue. This condition also affects the children when in busy moving environments. The world becomes overwhelming, producing anxiety and even panic attacks at times.

Treatment requires an inter-professional team, including the treating physician, a vision specialist such as an optometrist or ophthalmologist practicing Neuro-Visual Processing Rehabilitation (NVPR), a neuropsychologist specializing in Lyme disease and a social worker. The vision exam may include a sensorimotor evaluation, comprehensive refraction, and dynamic testing of accommodation and convergence, a VEP and a vision-balance gait analysis. Special prescriptive glasses for distance and near vision with prisms that rebalance the spatial visual process may be recommended.

## Educating Children With Tick-Borne Diseases and PANS

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When a child has tick-borne disease symptoms parents consider options for educating their children. Although most may choose public school, others may decide on private school or home schooling. According to leading pediatrician Dr. Charles Ray Jones, of blessed memory, most parents choose public school since these schools are bound by federal legislation to provide services to disabled students.

A child who needs accommodations and modifications can be helped by civil rights legislation. Many parents start with a request for a 504 plan, generating a meeting to begin the process. The law that requires that children who qualify under Section 504 of the 1973 Rehabilitation Act are entitled to a plan that will "level the playing field." Examples include extended time and/or a separate place for test-taking, a peer scribe to take notes for the student as needed, using bathrooms without having to wait till the break.

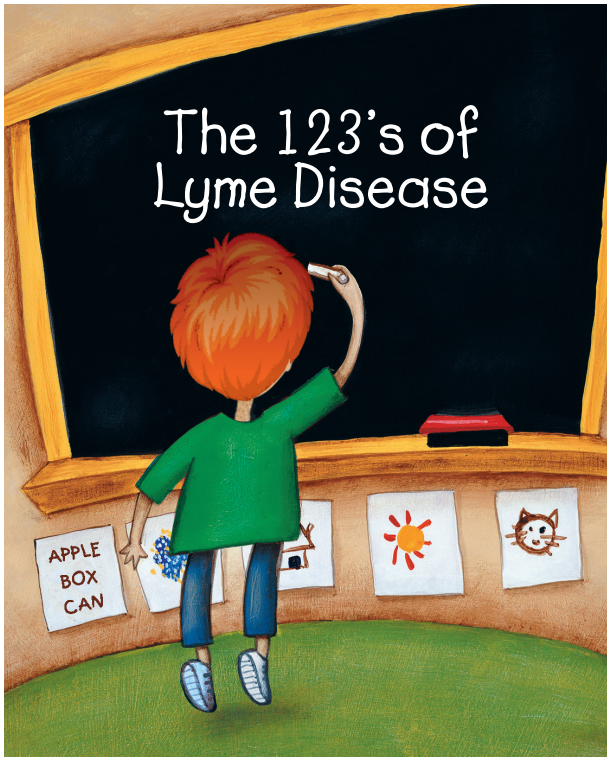
If, however, the student has the need for "specialized instruction," the child requires a "classification," and an IEP is necessary. The body of federal law that governs this is the Individuals with Disabilities Education Act (IDEA). If the student qualifies, the child study team (including the parents) meets to develop an IEP.

If a student meets the criteria designated in the IDEA, the child study team, including the parents, develops an IEP. A well thought out and well written IEP helps a child get the supports they need to be successful, despite their documented disabilities. The law behind this system requires that every classified child be provided a "Free and Appropriate Public Education (FAPE)." All states must comply with this Federal law. Appeals can be made if the school is not compliant.

It is very helpful for parents to use a Lyme-literate advocate, who understands education advocacy. By doing this early on, parents can avoid potential pitfalls. For example, many parents assume that they must sign an IEP or 504 Plan even if they disagree with the content of the document. In my experience in working with parents and child-study teams, that is not the case. For children outside of the public school system, it is noteworthy that some private schools voluntarily provide help similar to 504 plans.

When it comes to home schooling, parents must become familiar with the laws of their state.






## Important Information for Parents, Educators & School Nurses

IN MEMORY OF PAT SMITH
LA4K™ LymeAid 4 Kids
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## LymeAid 4 Kids National Program

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