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Neuroborreliosis:

Neuroborreliosis is a term coined to identify a *Borrelia* infection in the brain. Neurological presentations of Lyme Disease may vary and can include diagnoses of Amyotrophic Lateral Sclerosis, Multiple Sclerosis, Alzheimer's Disease, Tourettes Syndrome, Obsessive Compulsive Disorder, Autism and Attention Deficit Disorder. Clearly these disease entities can exist without the presence of *Borrelia*, however there is mounting scientific evidence suggesting that in fact chronic Lyme Disease or gestational exposure to *Borrelia* may be a contributing factor to the evolution of these diseases.

Without question, spirochetes cross the blood brain barrier and not only invade the microglial cells but degrade neurons by destroying the myelin sheath, a fatty acid layer that coats neurons and promotes electrochemical conduction of nerve signals. Interestingly, at the turn of the 20th century, neurosyphilis was identified and subsequently treated with Penicillin very effectively. Now at the turn of the 21st century, we see the emergence of another closely related spirochete, *Borrelia*. There are probably very interesting parallels here. Depending on the severity of the disease, intravenous antibiotics may be required for effective treatment of neuroborreliosis. It has been noted by several physicians that neuroborreliosis is common in people who received a tick bite to the head or neck. Presumably the spirochetes did not have to travel far in the blood stream to affect the brain.

Yeast and Lyme Disease:

Fungal or yeast infections can occur as the result of many risk factors including: mold exposure, allergic constitution, corticosteroid use, autoimmune illness, alcoholism, being in an immunocompromised state coupled with poor diet, high sugar intake and long term antibiotic use. Common symptoms associated with a yeast infection are: gastrointestinal gas, bloating, cramps, irregular bowel movements, fatigue, cognitive difficulties, fuzzy thinking, mood swings, sugar and carbohydrate cravings, chronic sinusitis, chronic vaginal yeast infections, beefy red and itchy rashes and other multisystemic complaints. This is particularly relevant to children who have been diagnosed with "Autism" and where a *Borrelia* infection is also identified. Autistic children are notorious for having gastrointestinal yeast issues and therefore antibiotic therapy may not be the most efficacious way to treat

Lyme Disease. There are a variety of nutritional and herbal ways to treat this condition. Clearly, significantly more research is needed in this area.

Long term antibiotic use is absolutely related to yeast development. Therefore, great precaution needs to be taken in order to circumvent this problem. Again, there are a variety of herbal and nutritional supports to help with the management of this condition. In some cases, patients need to take an antifungal for several months to get the yeast problem under control. The use of appropriate probiotics is of paramount importance to maintain intestinal integrity while undergoing treatment.

Gestational Exposure to Lyme Disease:

Borrelia, *Bartonella*, *Ehrlichia*, *Babesia* and *Mycoplasma* infections may cross the placental barrier and result in a condition known as gestational exposure to Tick Born Diseases. There is not much known about this although it has been documented. Perhaps *Borrelia* is the most likely candidate for this. In fact, a *Borrelia* infection may be related to the increased incidence of Autism in the last 25 years. Nearly 1 in 150 children are diagnosed with Autism each year and this number continues to escalate. Not all Autistic children have Lyme Disease but there are enough to warrant proper blood or urine testing for this condition. Dr. Jones and I have treated many children with “Autism Spectrum Disorder” diagnoses who had both *Borrelia* and *Mycoplasma* infections and they responded to antibiotics very well. However, each case is unique and requires a proper diagnostic workup. No assumptions can be made but if identified, other family members may want to be tested for these infections.

Sexual Transmission of *Borrelia*:

There is evidence to suggest that *Borrelia* may be sexually transmitted as well. There is not much scientific literature on this, however, if you look at syphilis which is known to be sexually transmitted, it is not a significant cognitive leap to presume the same for *Borrelia*. It may be more easily transmitted from male to female through semen, but it has also been documented in the vaginal secretions of women. Significantly more research is needed in this area but I like to suggest protected sex for people who are partnered in order to avoid the possibility of spreading the disease. Always to be better safe than sorry.