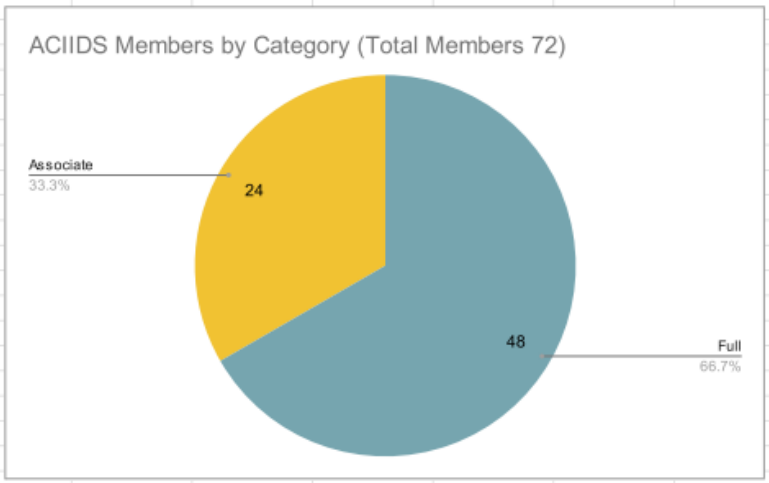
Australian
*Chronic Infectious & Inflammatory Disease*
Society

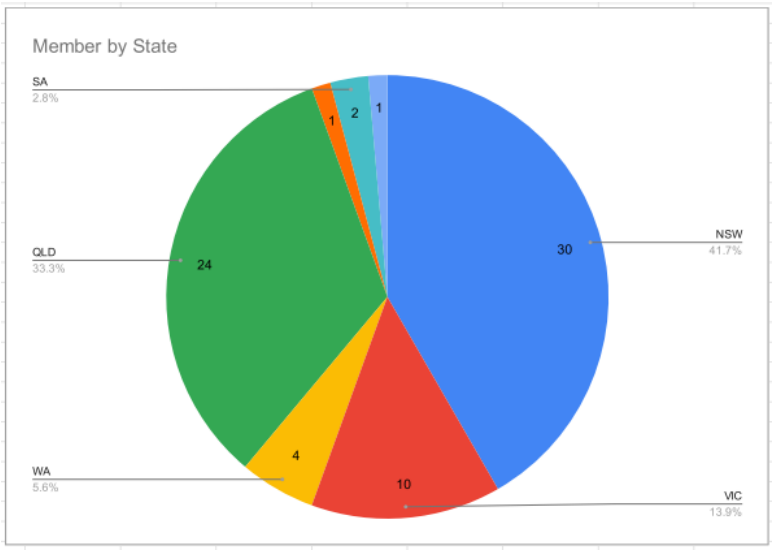
Submission for Senate Inquiry into

# "Access to diagnosis and treatment for people in Australia with tick-borne diseases"

## Introduction

The Australian Chronic Infectious and Inflammatory Disease Society (ACIIDS) is a society of registered medical practitioners (full members) and allied health practitioners (associate members) which was established in 2014 in New South Wales. It is a public company limited by guarantee. The total number of current members is 72.




The purpose of the society is to provide education, advocacy and promote evidence-based diagnosis and treatment of chronic infectious and inflammatory disease. One example of an illness our interest extends to is *mast cell activation syndrome*. The

group considers that illness of this type is under-recognised in both primary and secondary health care settings.

Furthermore, chronic infectious and inflammatory disease contributes greatly towards the economic and social burden of illness in Australia through lost wages, reduced productivity, burden of comorbid conditions and through the financial, healthcare services and welfare burden of the disease.

We consider that tick-borne diseases (TBD) can in certain instances fall under the banner of being a chronic infectious and/or inflammatory disease, via the mechanisms of chronic inflammation, autoimmunity, mast cell activation and/or persistent infection.

We make further comment below under the terms of reference of this inquiry.

a. **The initiatives and resources developed to improve awareness, diagnosis, treatment and management of tick-borne diseases in Australia since the release in 2016 of the Community Affairs References Committee report Growing evidence of an emerging tick-borne disease that causes a Lyme-like illness for many Australian patients;**

The understanding of our society is that the final report in response to the 2016 Community Affairs References Committee report was a number of recommendations which included recommendation 3 which reads as follows:

*3.54 The committee recommends that government medical authorities, in consultation with stakeholders including the Australian Chronic Infectious and Inflammatory Diseases Society (ACIIDS) and the Karl McManus Foundation, establish a clinical trial of treatment guidelines developed by ACIIDS with the aim of determining a safe treatment protocol for patients with tick-borne illness.*

The Australian Government response to the report appeared to propose a different path of action, proposing a multidisciplinary pathway based on their proposed nomenclature of Disabling Symptom Complexes Attributed to Ticks (DSCATT). This became known as the DSCATT clinical pathway.

As per the anecdotal reports from our society's members, this treatment pathway has not been widely utilised, nor has it led to any clinically significant changes in condition for patients with tick-borne disease. Recent communications have suggested that even infectious disease physicians appear to not be utilising the DSCATT clinical pathway.

**b. the adequacy and effectiveness of the 'debilitating symptom complexes attributed to ticks' clinical pathway to support patients;**

It is the opinion of our society, that although created with the best of intentions, the DSCATT pathway is inadequate to improve the clinical condition of patients with tick-borne disease in Australia and should be abandoned.

Our society has found that although some cases of tick-borne illness align with accepted diagnostic categories in Australia (eg Australian tick typhus), a significant proportion of them have a chronic multisystem illness which is poorly categorised based on NATA-accredited diagnostic tests in Australia. Although the patients may suffer from secondary depressive symptoms due to the weight of their illness, our society does not consider that a primary psychological cause is present in most cases.

ACIIDS recommends that the government considers a return to the original senate report recommendations and collaboration with our organisation amongst others to assist the plight of tick-borne disease patients in Australia.

Our society is willing and able to liaise with the government regarding the establishment of:

1. *A new case definition for the latter category of tick-borne illness*
2. *The establishment of novel biomarkers for this category of illness*
3. *The procurement of higher quality evidence-based diagnostic testing kits for tick-borne disease*
4. *The establishment of evidence-based treatment guidelines for this illness*

**c. current research to advance the management of complex inflammatory diseases; and**

It has become increasingly clear since the advent of COVID-19 how certain pathogens can significantly disrupt immune system responses resulting in chronic

inflammatory symptoms, through intersecting mechanisms of pathogen persistence, mast cell activation, endothelial dysfunction, microthrombotic events, impairment of adequate host immune responses, and gastrointestinal microbial dysbiosis.

COVID-19 is not alone in its ability to result in a multi-system inflammatory syndrome (Long COVID), with vector borne pathologens such as borrelia, bartonella, babesia, rickettsia, anaplasma, ehrlichia all known to be drivers of chronic inflammation in the medical literature via the above listed mechanisms.

The result of not identifying tick-borne pathogens like these as driving causes of a patient's inflammatory illness can be devastating. Chronic manifestations of vector borne disease are consistently associated with significant and longstanding impairments in QoL scores.

Despite the controversy regarding terms such as "Chronic Lyme disease", "Lyme-like illness" etc, the best representation of chronic tick-borne disease in the overseas literature falls under the umbrella of Chronic Lyme disease. Therefore this literature is used simply as an example of chronic tick-borne disease, and not to suggest that this term should be adopted in the Australian setting.

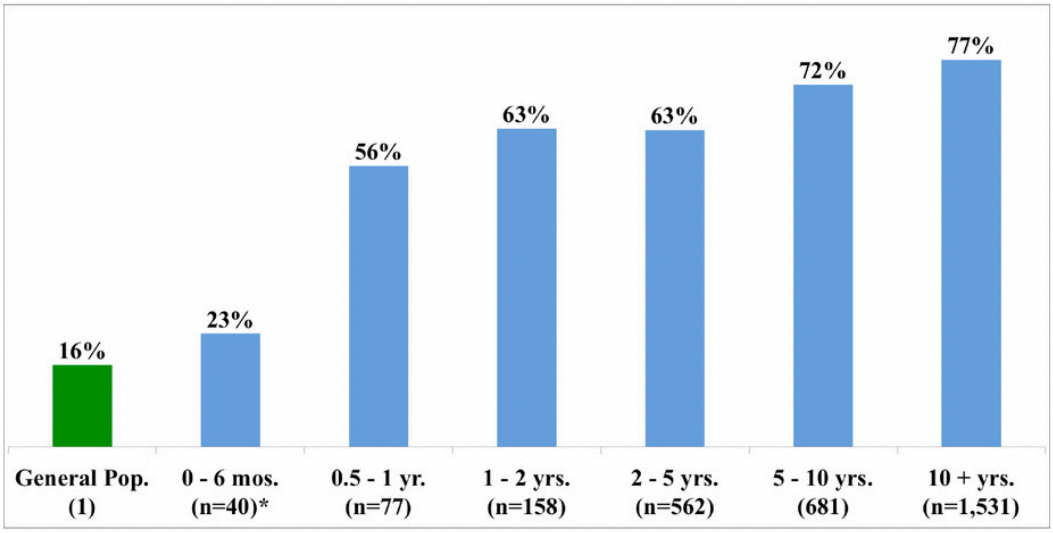
One study found that chronic tick-borne disease patients had pain levels equal to those of post-surgical patients, fatigue scores on par with multiple sclerosis patients, and physical functioning similar to patients with severe congestive cardiac failure (see Figure 1). Researchers have found that even for those patients who have been diagnosed and treated promptly, many often remain ill for prolonged periods of time following treatment and some experience disease progression despite treatment.

The economic burden of chronic manifestations of tick-borne disease is substantial. Survey responses from patients diagnosed with CDC criteria confirmed tick-borne illness who had been ill for >6 months, found that 39.4% and 28.3%, respectively, stopped or reduced their work hours or role and 37.3% spent at least $5000 on TBD-related out-of-pocket expenses. A further study employing a medical insurance claims database also documented the financial consequences of chronic TBD. Of the 52,795 individuals diagnosed and treated for chronic TBD, total costs over a 12-month post-treatment period for patients who had one or more post-treatment Lyme disease (PTLD) symptoms were $3798 higher than for those who had none.

A psychiatrist specialising in chronic manifestations of chronic TBD, Dr Robert Bransfield, in 2017 released a report estimating 12,000 suicides, 31,000 suicide attempts, and 15,000 self harm events occur in the US every year due to chronic tick-borne disease.

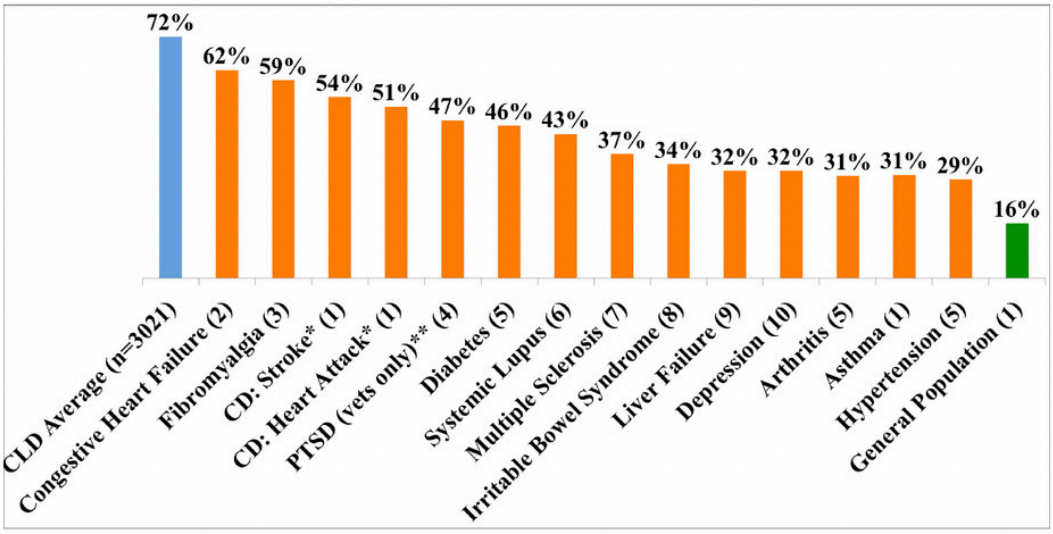
## Figure 1: Quality of Life Scores in Chronic Lyme disease

**(A) Survey respondents reporting fair or poor health as a function of time with Lyme disease.**




**Includes patients who did not meet the inclusion criteria of continuing symptoms at least six months after antibiotic treatment.*

**(B) Survey respondents reporting fair or poor health compared to the general population and patients with other chronic diseases.**




** CD refers to Cardiovascular Disease.** PTSD (vets only) refers to Post Traumatic Stress Disorder among military veterans.*

### Chronic Symptoms from Tick Borne Diseases

For the purposes of this submission, we refer to literature on Chronic Lyme disease in reference to the wide-ranging pathogens and inflammatory sequelae of chronic tick-borne disease. Leading US expert in chronic vector borne disease Dr Richard Horowitz has termed the condition multisystem infectious disease syndrome

(MSIDS), and has developed a validated MSIIDS Questionnaire to determine the symptom burdens of complex illness patients, with corresponding likelihood of vector bourne disease associated with score severities. Many ACIIDS members are using the MSIDS Questionnaire as a screening tool to assist in identifying chronic tick-borne or even vector-borne disease as a broader category.

The aetiology of persistent clinical manifestations in patients previously treated for acute tick-borne infections continues to be debated as the pathophysiologic evidence base continues to expand and evolve. Several mechanisms, including tissue injury, secondary conditions, unrecognised or undertreated co-infections, immune dysfunction of several types, and persistent infection have been proposed.

As of October 25th, 2023, the CDC revised its stance on the existence of Chronic TBD, and now recognises the existence of chronic symptoms from borrelia infection.

The ACIIDS group is persuaded by the substantial amount of evidence of persistent borrelia infection post-antibiotic treatments in both animal and human studies, which agrees with borrelia species' known effectiveness at evading immune responses and ability to change forms on exposure to antibiotics to persister states with greater resistance to antibiotic therapy, described by Feng et. al in 2019.

**Rising Incidence of TBD**

Current research into vector-borne disease is continuing to identify a greater number of pathogen species transmitted by ticks, with further insights into how rapidly vector-borne disease is spreading globally in step with the world's changing climate and increased urbanisation. As of October 2024, 47 species of Borrelia have now been identified (Qiu et al., 2024), and a 2022 study published in BMJ Global Health estimates that 14.5% of the world's population has at some point been infected by borrelia species. Borreliosis prevalence has doubled from 2010 to 2021, compared to 2001 to 2010, with current CDC estimates at 500,000 cases annually in the USA, making Lyme disease the fastest growing and most common vector-borne disease in the United States.

Other vector borne bacterial illnesses are also increasing in incidence, and are common co-infections, as ticks are known to carry multiple bacterial species that infect with a single biting event. It is estimated that borreliosis vector transmission occurs with at least one other tick-borne pathogen >70% of the time, based on the overseas literature.

The rate of co-infections in TBD makes accurate diagnosis and treatment all the more challenging, where clinicians need to be well-versed in utilising treatments to

address bartonella, babesia, rickettsia, ehrlichia and anaplasma simultaneously where indicated.

As the ACIIDS group discussed in our 2016 submission, it is highly probable that a species of borrelia primarily responsible for a chronic Lyme-like illness in Australia has not yet been identified. A 1994 cross-sectional study of ticks in Australia not finding Borrelia Burgdorferi species, in our view, is grossly insufficient to conclude that Australia does not contain borrelia species, especially in light of the emerging technologies available in 2025 being able to identify vector borne disease much more effectively.

Many ACIIDS members have identified patients who have had tick bites in Australia, contract an illness clinically diagnostic of Lyme, who also test positive for Lyme diase serology (in Australian NATA and US-based accredited testing), with complete resolution of symptoms with anti-borrelia treatments.

**Management of Chronic Inflammatory Illness**

The members of ACIIDS understand that a targeted, multi-modal integrative approach is essential in the treatment of chronic illness, requiring a knowledge of how to manage the multiple imbalances that ensue in the context of persistent inflammation +/- infection. Treating chronic vector-borne disease requires more than antimicrobial based therapies for patients to find remission, as rectifying a patient's micronutrient deficiencies, addressing mast cell activation, maintaining gastrointestinal barrier function with a healthy diet and evidence-based botanicals and probiotic therapies, goes a long way towards allowing the immune system to function more optimally to resolve inflammatory process and suppress pathogen activity.

A growing number of ACIIDS doctors are utilising a wider array of tools to treat chronic inflammatory and infectious disease:

a. Evidence-based botanical medicines with known anti-infective properties
b. Repurposed pharmaceuticals with known anti-Borrelia, anti-Bartonella, anti-parasitic properties — eg: Disulfiram, Methylene Blue.
c. At times, pharmaceutical antibiotics judiciously chosen to target the multiple forms of vector borne bacterial infections, including intracellular forms, biofilm forms, and persister forms.
d. Immune modulators to interrupt cytokine cascades triggered by vector borne disease (eg: TNF-a, IL-1, IL-6, IL-8, IL-1B, VEGF), including mast cell stabilisers like antihistamines, Histamine 2 receptor blockers, sodium cromoglycate, ketotifen, and low dose naltrexone.

e. Targeted nutrient therapy to optimise immune function.

f. Other therapies listed in the ACIIDS 2016 Submission Document.

Whilst beyond the scope of this submission to provide in-depth discussion of the above, the ACIIDS group are highly willing to collaborate with the Australian Senate to formulate safe and effective protocols with sound evidence base that incorporates a holistic approach to treating patients with chronic inflammatory vector-borne disease.

Encouragingly, there are more emerging effective treatments for addressing pathogen persistence than ever, such as the below list of botanicals with known anti-infective and anti-inflammatory properties with utility in treating chronic infections such as borrelia.

**Table 1.** Activity of Herbal Compounds Commonly That Patients Use for Lyme Symptoms. the categories for each compound's evidence include: (1) activity = +, (2) no activity = -, and (3) mixed activity = +/-[4-40]

| Common Name | Antibacterial | Anti-borrelia | Anti-inflammatory | Symptomatic (Other) |
|---|---|---|---|---|
| Andrographis[5,6,14] | +/- | - | + | + |
| Astragalus[15,30] | + | - | + | + |
| Berberine[16,41] | + | - | + | + |
| Cat's claw[5,17] | + | + | + | + |
| Cordyceps[18,31] | + | - | + | + |
| Cryptolepis[5,19] | + | + | + | + |
| Chinese skullcap[5,20,28] | + | + | + | + |
| Garlic[21,22] | + | - | + | + |
| Japanese knotweed[5,7,8] | + | + | + | + |
| Sweet wormwood[5,9,10,29,32,54] | + | + | + | + |
| Reishi mushrooms[23] | + | - | - | + |
| Sarsaparilla[11,24] | +/- | - | + | + |
| Siberian ginseng[25] | - | - | + | + |
| Teasel root[13] | - | - | - | - |
| Lemon balm[5,33,34] | + | - | + | + |
| Peppermint[5,26,35-37] | + | - | + | + |
| Thyme[13,27,38,39] | +/- | + | +/- | + |
| Oil of oregano[12,40] | + | + | - | - |

**Table 1: From "A Comprehensive Review of Herbal Supplements Used for Persistent Symptoms Attributed to Lyme Disease" — Thompson et al., 2023**

It is the ACIIDS' group hope that integrative approaches incorporating a broad array of treatment modalities can be used to formulate more effective protocols in managing complex chronic illness from tick-borne disease.

## Conclusion

Our society considers that chronic infectious and inflammatory disease (including chronic tick-borne disease) contributes greatly towards the economic and social

burden of illness in Australia through lost wages, reduced productivity, burden of comorbid conditions and through the financial, healthcare services and welfare burden of the disease.Although created with the best of intentions, the DSCATT pathway is inadequate to improve the clinical condition of patients with tick-borne disease in Australia. We propose a reconsideration of the path of action taken by the Australian government in response to the 2016 Community Affairs References Committee report on tick-borne infections causing a Lyme-like illness in Australians, to include collaboration with our society, amongst other organisations with the aim of improving the outcomes of patients with tick-borne disease in Australia.

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**References : Case Definition, Economic Impacts of Chronic Tick-Borne Disease**

1. Stricker, R.B.; Fesler, M.F. Chronic Lyme Disease: A Working Case Definition. Am. J. Infect. Dis. 2018, 14, 1–14. [CrossRef]
2. Klempner, M.S.; Hu, L.T.; Evans, J.; Schmid, C.; Johnson, G.; Trevino, R.; Norton, D.; Levy, L.; Wall, D.; McCall, J.; et al. Two controlled trials of antibiotic treatment in patients with persistent symptoms and a history of Lyme disease. N. Engl. J. Med. 2001, 345, 85–92.
3. Krupp, L.B.; Hyman, L.G.; Grimson, R.; Coyle, P.K.; Melville, P.; Ahnn, S.; Dattwyler, R.; Chandler, B. Study and treatment of post Lyme disease (STOP-LD): A randomized double masked clinical trial. Neurology 2003, 60, 1923–1930.
4. Cameron, D. Severity of Lyme disease with persistent symptoms. Insights from a double-blind placebo-controlled clinical trial. Minerva Med. 2008, 99, 489–496.
5. Johnson, L.; Wilcox, S.; Mankoff, J.; Stricker, R.B. Severity of chronic Lyme disease compared to other chronic conditions: A quality of life survey. PeerJ 2014, 27, e322.
6. Adrion, E.R.; Aucott, J.; Lemke, K.W.; Weiner, J.P. Health care costs, utilization and patterns of care following Lyme disease. PLoS ONE 2015, 10, e0116767.

**References: Mechanisms of Persisting Symptoms Post-Acute Tick-Borne Illness Infection**

1. Wormser, G.P.; Dattwyler, R.J.; Shapiro, E.D.; Halperin, J.J.; Steere, A.C.; Klempner, M.S.; Krause, P.J.; Bakken, J.S.; Strle, F.; Stanek, G.; et al. The clinical assessment, treatment, and prevention of Lyme disease, human granulocytic anaplasmosis, and babesiosis: Clinical practice guidelines by the Infectious Diseases Society of America. Clin. Infect. Dis. 2006, 43, 1089–1134. [CrossRef] [PubMed]
2. Kanjwal, K.; Karabin, B.; Kanjwal, Y.; Grubb, B.P. Postural orthostatic tachycardia syndrome following Lyme disease. Cardiol. J. 2011, 18, 63–66. [PubMed]
3. Dinerman,H.;Steere,A.C.Lyme disease associated with fibromyalgia. Ann. Intern. Med. 1992,117,281–285. [CrossRef] [PubMed]

4. Bransfield,R.C.Thepsychoimmunologyoflyme/tick-bornediseasesanditsassociationwithneuropsychiatric symptoms. Open Neurol. J. 2012, 6, 88–93. [CrossRef] [PubMed]

5. Nicolson,G.L.;Settineri,R.;Ellithorpe,R.LipidReplacementTherapywithaGlycophospholipidFormulation with NADH and CoQ10 Significantly Reduces Fatigue in Intractable Chronic Fatiguing Illnesses and Chronic Lyme Disease Patients. Int. J. Clin. Med. 2012, 3, 163–170. [CrossRef]

6. Jutras,B.L.; Savage,C.R.; Arnold,W.K.; Lethbridge, K.G.; Carroll,D.W.; Tilly,K.; Bestor,A.; Zhu,H.; Seshu,J.; Zückert, W.R.; et al. Borrelia burgdorferi peptidoglycan is a persistent antigen in patients with Lyme arthritis. Proc. Natl. Acad. Sci. USA 2019, 116, 13498–13507. [CrossRef]

7. Bockenstedt, L.K.; Gonzalez, D.G.; Haberman, A.M.; Belperron, A.A. Spirochete antigens persist near cartilage after murine Lyme borreliosis therapy. J. Clin. Investig. 2012, 122, 2652–2660. [CrossRef]

8. Arvikar,S.L.; Crowley,J.T.; Sulka,K.B.; Steere,A.C. Autoimmune Arthritides, Rheumatoid Arthritis, Psoriatic Arthritis, or Peripheral Spondyloarthritis Following Lyme Disease. Arthritis Rheumatol. 2017, 69, 194–202. [CrossRef] [PubMed]

9. Maccallini, P.; Bonin, S.; Trevisan, G. Autoimmunity against a glycolytic enzyme as a possible cause for persistent symptoms in Lyme disease. Med. Hypotheses 2018, 110, 1–8. [CrossRef] [PubMed]

10. Fallon,B.A.; Levin,E.S.; Schweitzer,P.J.; Hardesty,D. Inflammation and central nervous system Lyme disease. Neurobiol. Dis. 2010, 37, 534–541. [CrossRef] [PubMed]

11. Strle,K.; Sulka,K.B.; Pianta,A.; Crowley,J.T.; Arvikar,S.L.; Anselmo,A.; Sadreyev,R.; Steere,A.C. T-Helper 17 Cell Cytokine Responses in Lyme Disease Correlate with Borrelia burgdorferi Antibodies During Early Infection and With Autoantibodies Late in the Illness in Patients With Antibiotic-Refractory Lyme Arthritis. Clin. Infect. Dis. 2017, 64, 930–938. [CrossRef] [PubMed]

**References : Persisting Infection states of Bartonellosis**

1. Anderson W. Bartonella like organisms (BLO): consideration, signs and symptoms Feb. 17, 2013.

2. Breitschwerdt et al.. Bartonella sp. bacteremia in patients with neurological and neurocognitive dysfunction. 2008

3. Breitschwerdt et al. Bartonella Associated Cutaneous Lesions (BACL) in People with Neuropsychiatric Symptoms. December 4, 2020

4. Maggi RG et al. Bartonella spp. Bacteremia in high-risk immunocompetent patients. September 1, 2011

5. Johnson et al. Disseminated Cat Scratch Disease in pediatric Patients in Hawaii. May 19, 2020

6. Minnick MF, Battisti JM. Pestilence, persistence and pathogenicity: infection strategies of Bartonella

7. Maman et al. Musculoskeletal Manifestations of Cat Scratch Disease. Clinical Infectious Disease. Dec 15, 2007

8. Battling Bartonellosis: Articles listed in Neurologic Manifestations. April 22, 2020 and Rheumatologic Manifestations. April 24, 2020

9. Galaxy Advance Microbial Diagnostics. Understanding hidden infection: Cat Scratch Disease (Bartonella) 2021

10. Bartonella: new science revives a neglected infection. ILADS Winter 2014 Newsletter.

11. Bartonella henselae bacteremia in a mother and son potentially associated with tick exposure: Maggi RG, Ericson M,

12. Mascarelli PE, Bradley JM, Breitschwerdt EB SOURCE: Parasites & Vectors April 2013, 6:101 doi:10.1186/1756-3305-6-101 http://dx.doi.org/10.1186/1756-3305-6-101

13. Bartonella henselae infection in a family experiencing neurological and neurocognitive abnormalities after woodlouse hunter spider bites AUTHORS: Mascarelli PE, Maggi RG, Hopkins S, Mozayeni BR, Trull CL, Bradley JM, Hegarty BC, Breitschwerdt EB SOURCE: Parasites & Vectors 2013, 6:98 doi:10.1186/1756-3305-6-98 http://www.parasitesandvectors.com/content/6/1/98/abstract

14. Bartonella henselae: evidence for a novel tick-borne disease complex. AUTHORS: Eskow E, Rao RV, Mordechai E.: Arch Neurol. 2001 Sep;58(9):1357-63.

15. Detection of Bartonella henselae by polymerase chain reaction in brain tissue of an immunocompromised patient with multiple enhancing lesions. Case report and review of the literature.: George TI, Manley G, Koehler JE, Hung VS, McDermott M, Bollen A. SOURCE: J Neurosurg. 1998 Oct;89(4):640-4. Review.

16. Do bartonella infections cause agitation, panic disorder, and treatment-resistant depression?: Schaller JL, Burkland GA, Langhoff PJ. SOURCE: MedGenMed. 2007 Sep 13;9(3):54.

17. Hallucinations, Sensory Neuropathy, and Peripheral Visual Deficits in a Young Woman Infected with Bartonella koehlerae: Edward B. Breitschwerdt EB, Mascarelli PE, Schweickert LA, Ricardo G. Maggi RG, Hegarty BC, Bradley JM, Woods CW. SOURCE: JOURNAL OF CLINICAL MICROBIOLOGY, Sept. 2011, Vol. 49, No. 9: p. 3415–3417

18. A Girl with Seizures: Carla Rothaus: NEJM. May 22nd, 2015 http://blogs.nejm.org/now/index.php/a-girl-with-seizures/2015/05/22/comment-page-1/#comment-225701 A Groundhog, a Novel Bartonella Sequence, and My Father's Death: Breitschwerdt EB, Maggi RG, Cadenas MB, Vissotto de Paiva Diniz PP SOURCE: Emerging Infectious Diseases • www.cdc.gov/eid • 2009 Aug;15(12): 2080-6 http://www.cdc.gov/eid/content/15/12/pdfs/ 2080.pdf