

Microbial Triggers of Autoimmunity: Borrelia and Autoimmunity in Lyme Disease

Lyme Infection-Associated Chronic Illnesses Treatment Workshop
July 11, 2024

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Autoimmune Diseases

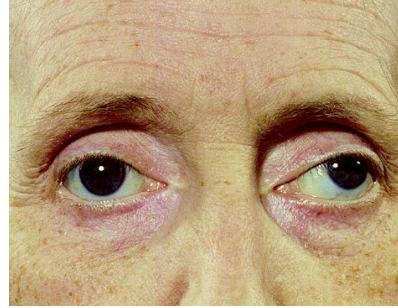
- 3% of humans
- Long thought to be triggered by viruses and bacteria



Psoriasis



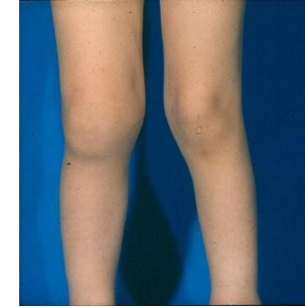
Rheumatoid arthritis



Myasthenia gravis



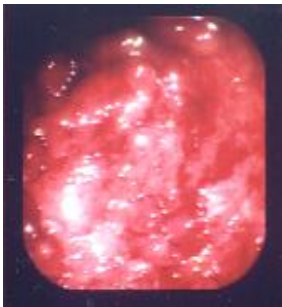
Pemphigus vulgaris



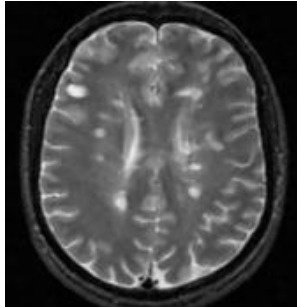
Juvenile idiopathic arthritis



Juvenile lupus



Inflammatory bowel disease



Multiple sclerosis



Systemic lupus erythematosus



Grave's disease



Juvenile arthritis



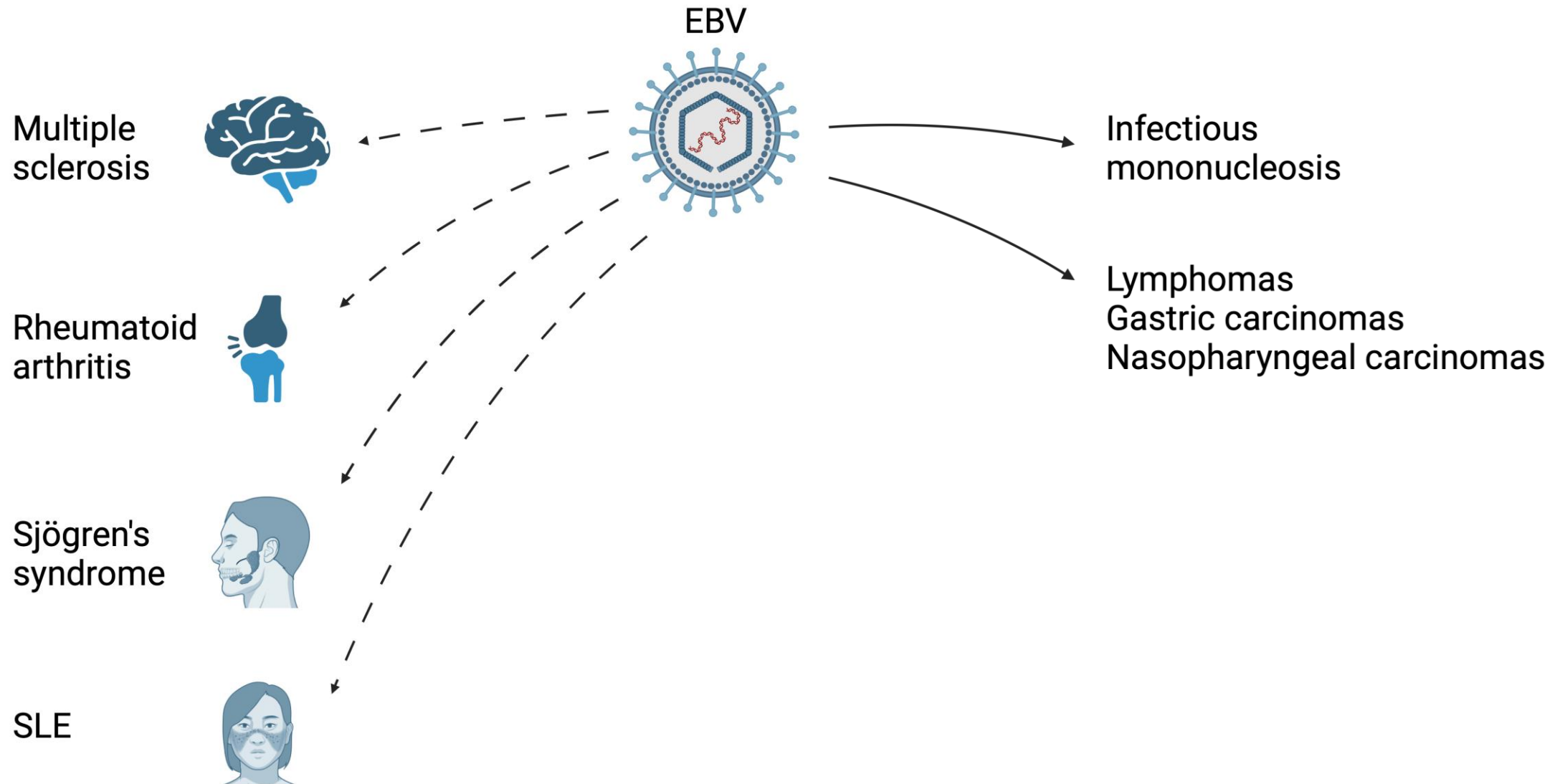
Juvenile dermatomyositis

Identification of Microbial Triggers of Autoimmune Diseases

Robinson lab

1. Multiple sclerosis: EBV
2. Lyme Disease: *B. burgdorferi*-induced autoimmunity → Subset of Lyme Disease

EBV has Long Been Associated with Cancer and Autoimmunity



EBV in Autoimmunity

Multiple sclerosis



Rheumatoid arthritis



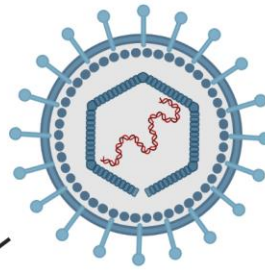
Sjögren's syndrome



SLE



EBV



REPORT

MULTIPLE SCLEROSIS

Longitudinal analysis reveals high prevalence of Epstein-Barr virus associated with multiple sclerosis

Kjetil Bjornevik^{1†}, Marianna Cortese^{1†}, Brian C. Healy^{2,3,4}, Jens Kuhle⁵, Michael J. Mina^{6,7,8}, Yumei Leng⁶, Stephen J. Elledge⁶, David W. Niebuhr⁹, Ann I. Scher⁹, Kassandra L. Munger^{1†}, Alberto Ascherio^{1,10,11*†}

Article

Clonally expanded B cells in multiple sclerosis bind EBV EBNA1 and GlialCAM

<https://doi.org/10.1038/s41586-022-04432-7>

Received: 6 August 2021

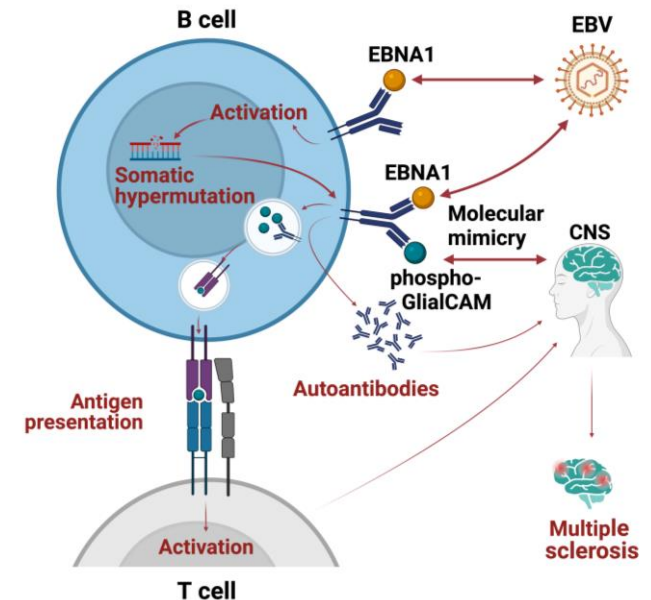
Accepted: 14 January 2022

Published online: 24 January 2022

Check for updates

Tobias V. Lanz^{1,2,3,4}, R. Camille Brewer^{1,4}, Peggy P. Ho⁵, Jae-Seung Moon^{1,4}, Kevin M. Jude⁶, Daniel Fernandez⁷, Ricardo A. Fernandes⁶, Alejandro M. Gomez^{1,4}, Gabriel-Stefan Nadj^{1,4}, Christopher M. Bartley⁸, Ryan D. Schubert⁹, Isobel A. Hawes⁹, Sara E. Vazquez¹⁰, Manasi Iyer¹¹, J. Bradley Zuchero¹², Bianca Teegen¹², Jeffrey E. Dunn¹², Christopher B. Lock¹³, Lucas B. Kipp¹³, Victoria C. Cotham^{14,15}, Beatrix M. Ueberheide^{14,15}, Blake T. Aftab¹⁶, Mark S. Anderson¹⁷, Joseph L. DeRisi^{10,18}, Michael R. Wilson⁹, Rachael J. M. Bashford-Rogers¹⁹, Michael Platten^{2,3,20}, K. Christopher Garcia⁴, Lawrence Steinman⁹ & William H. Robinson^{1,4,21}

Lanz ... Robinson. *Nature*, 2022.



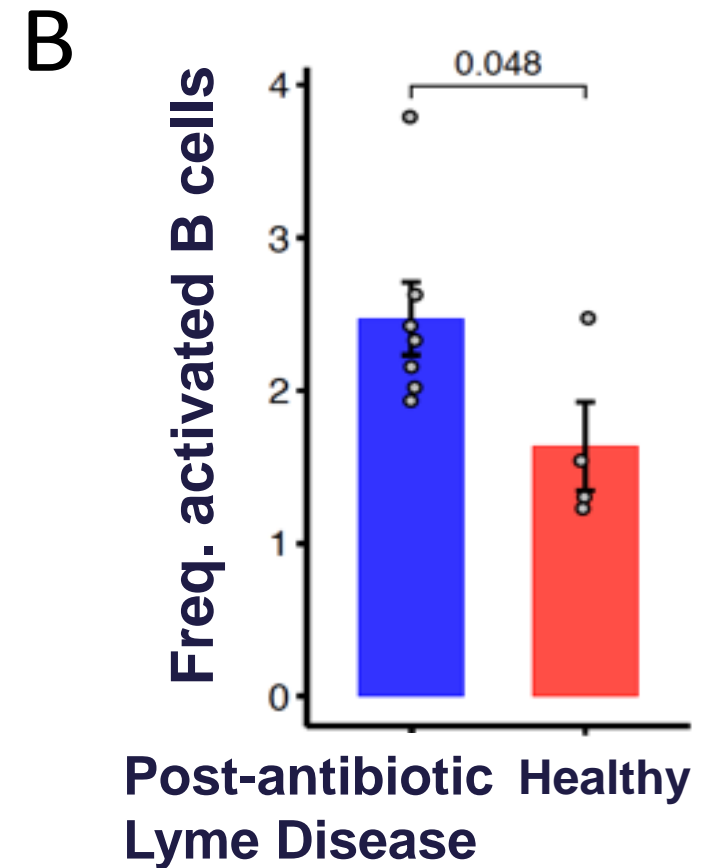
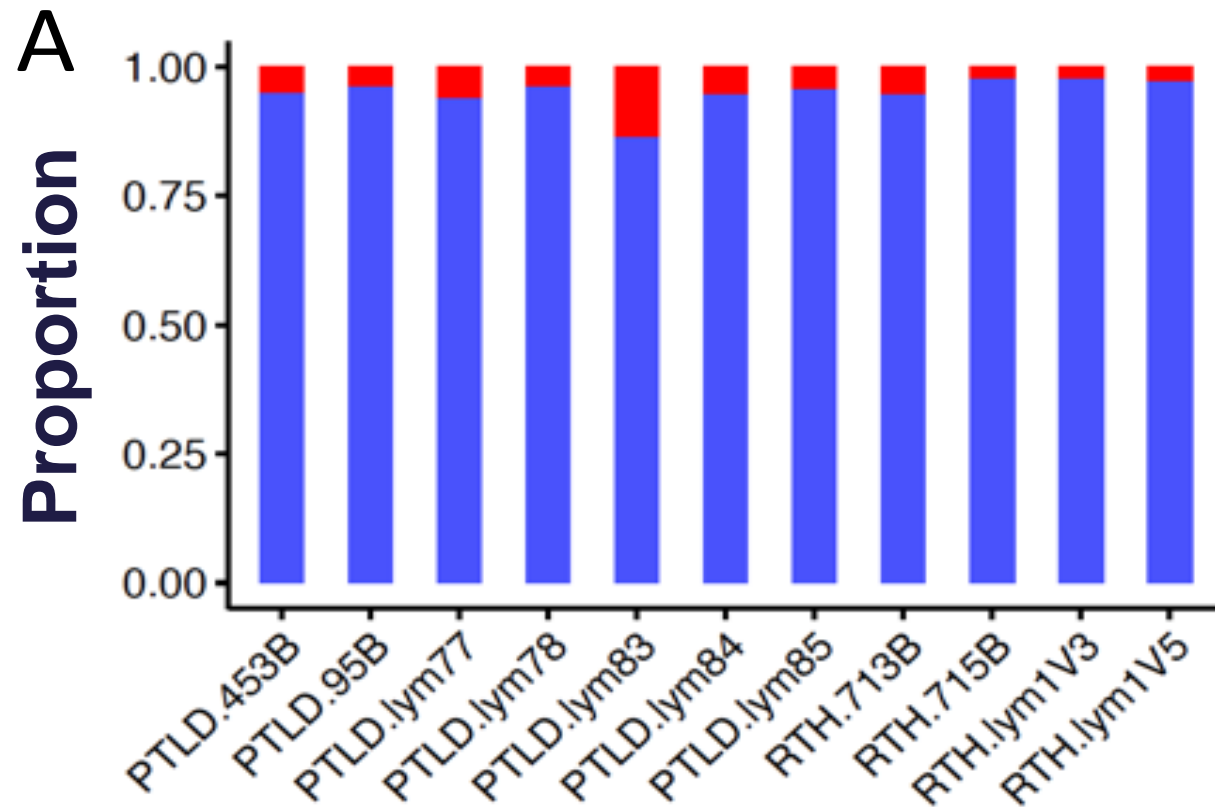
Hypothesis: *B. burgdorferi*-Induced Autoimmunity → Subset of Lyme Disease



Bb infection

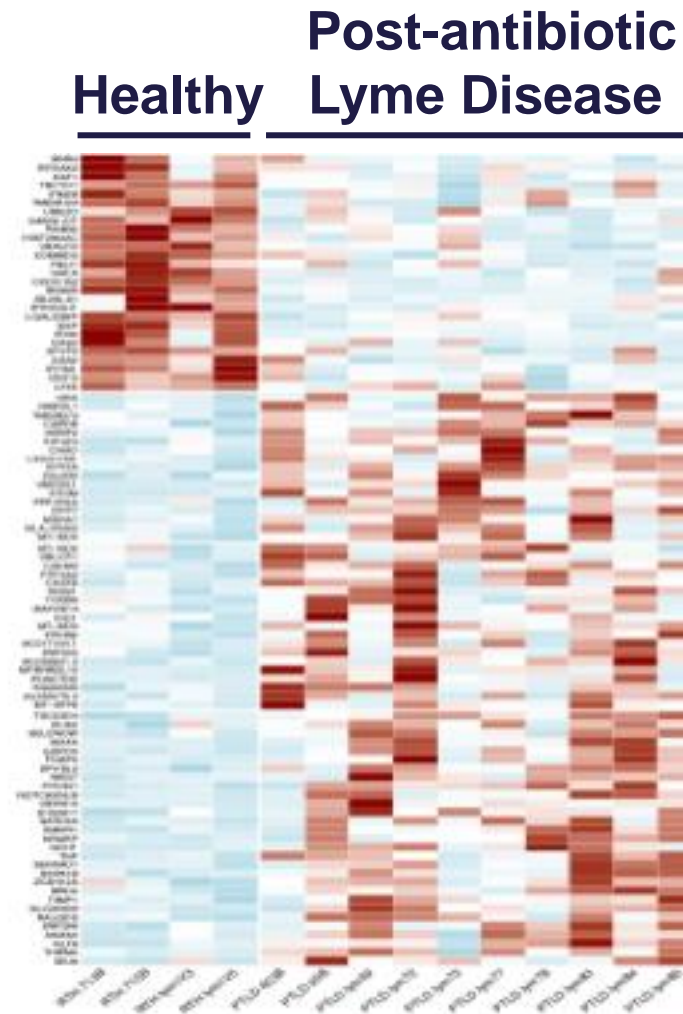
Increased Activated B cells in a Subset of Post-Antibiotic Lyme Disease

6 months post-*Borrelia burgdorferi* infection and antibiotic treatment:



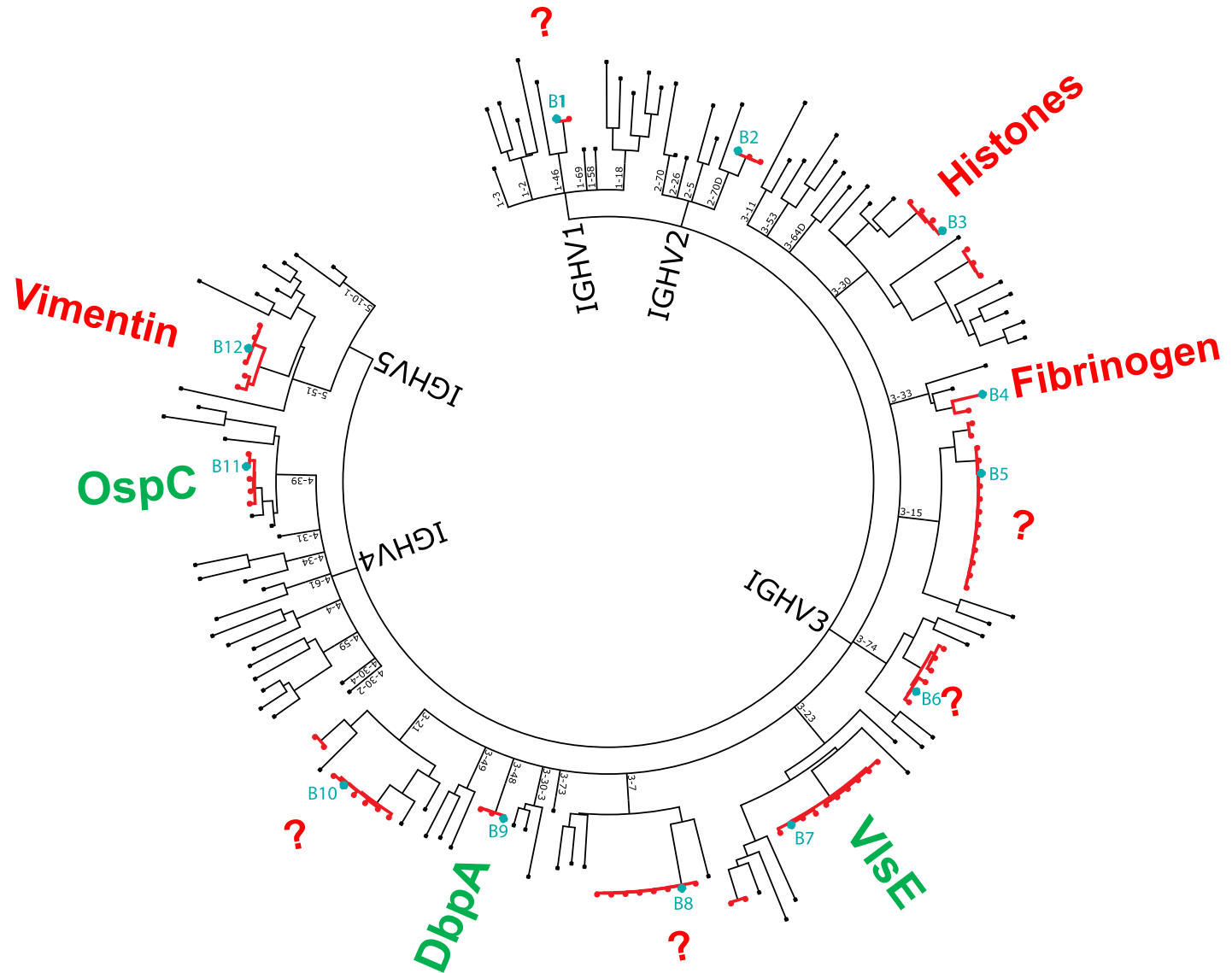
Transcriptional Dysregulation of Activated B cells in a Subset of Post-Antibiotic Lyme Disease

6 months post-*Borrelia burgdorferi* infection and antibiotic treatment:

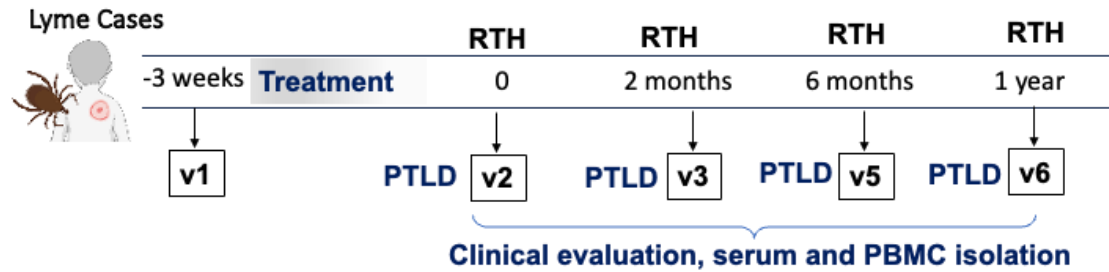


Activated B cells Produce Autoantibodies in a Subset of Post-Antibiotic Lyme Disease

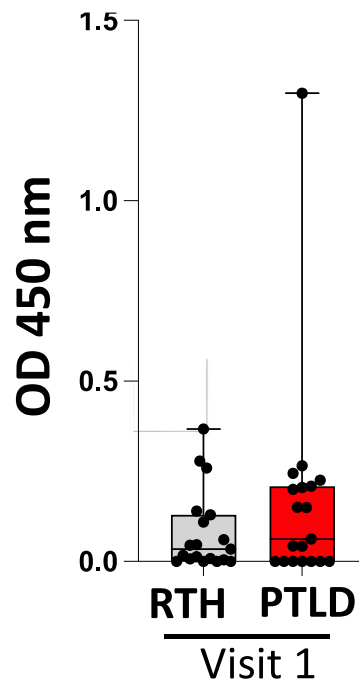
Post-antibiotic
Lyme Disease
antibody repertoire



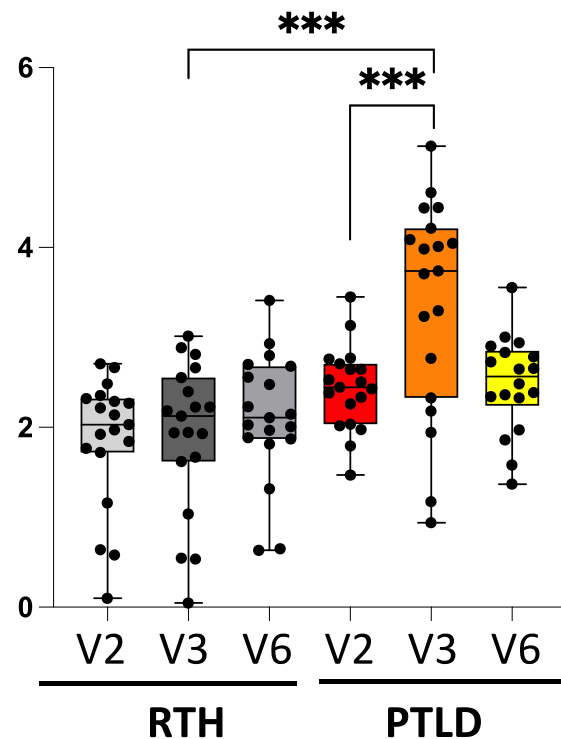
Serologic Findings Support EBV Reactivation in PTLD



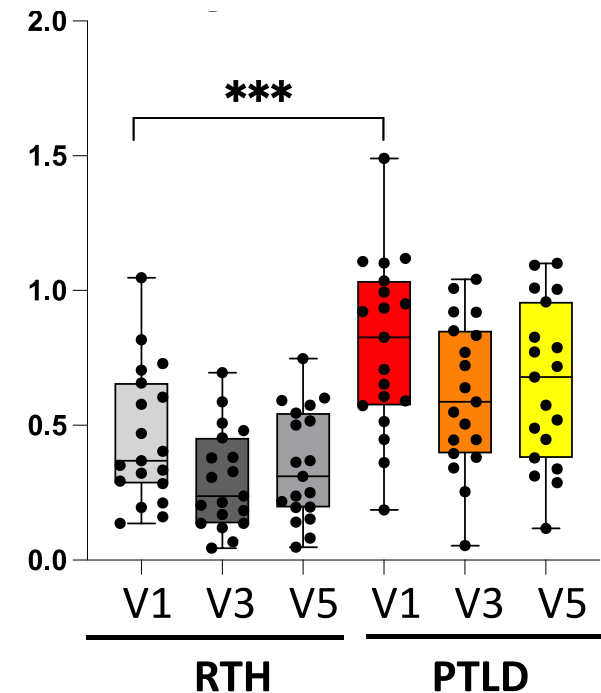
EBV VCA IgM



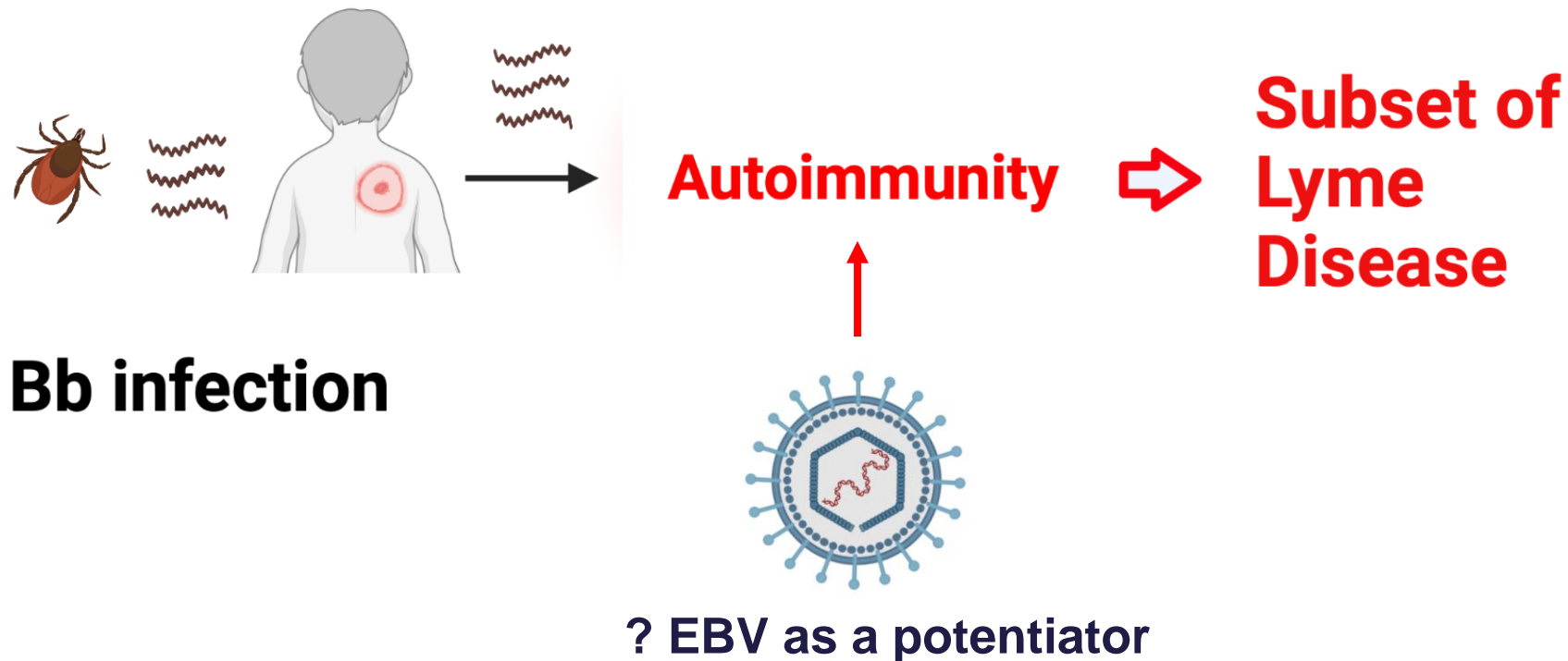
EBV VCA IgG



EBV EA-D IgG



Hypothesis: *B. burgdorferi*-Induced Autoimmunity → Subset of Lyme Disease



Acknowledgements

Robinson Lab

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Advancing Treatment | Finding Cures



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