2017 Internship Project & Abstract - Trever Koester

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Sero-surveillance of Powassan Virus and Characterization of Patients with Dual Sero-positivity for Lyme and Acute Epstein-Barr Virus Infection

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Research area: Clinical and Laboratory Research

Background: Due to geographic expansion of Ixodes scapularis, new pathogens, such as Powassan virus (POWV) and novel presentations of tick-borne diseases are emerging. The incidence and clinical features of POWV are poorly understood. Both Lyme disease and Epstein-Barr virus (EBV) are common infections in Lyme endemic areas, share symptomology, and have diagnostic cross-reactivity, making diagnosis difficult. However, little is known about patients with dual sero-positivity for both diseases.

Methods: Sero-surveillance was performed in the Upper Midwest to uncover and characterize cases of POWV. We created a biobank of patients who underwent tick-borne disease testing (anaplasmosis, babesiosis, and ehrlichiosis PCR detection, two-tiered Lyme serology) in summer 2017. Clinical data were abstracted into a RedCap database. Patients with negative tick-borne disease test results and symptoms of arboviral disease underwent POWV screening, consisting of a previously validated MAC-ELISA and arbovirus IgM panel. Additionally, cases of dual sero-positivity for Lyme and acute EBV infection in the MCHS from 1997-2017 were reviewed.

Results: Of the 1,100 specimen collected: 119 (11%) met POWV screening criteria, 173 (16%) had Lyme disease, 51 (5%) had anaplasmosis, and 2 (<1%) had babesiosis and ehrlichiosis each. POWV screening returned zero positive results. 52 cases of dual sero-positivity for Lyme and acute EBV infection were uncovered. Common symptomology included: fever (56%), lymphadenopathy (31%), and leukocytosis (27%). Patients appeared with more severe presentations as evidenced by high occurrences of hospitalization (14%) and hepatitis (14%). Three cases presented evidence of concurrent Lyme and acute EBV infection, a previously undocumented occurrence. Common symptomology included: fever (56%), lymphadenopathy (31%), and leukocytosis (27%).

Conclusions: The absence of positive POWV cases is consistent with its low occurrence in humans; however, could be attributed to a lack of antibody seroconversion. With the possibility of concurrent Lyme and acute EBV infection, comprehensive EBV and Lyme diagnostics should be considered in patients with shared symptomology. In Lyme endemic areas, treatment should be considered for patients with dual sero-positivity.