Surge in Anaplasmosis cases in Maine, USA: uptick in transmission, testing effort, or both?

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Background: Since the first case report in the late 1980's, Lyme disease incidence in Maine, USA has coincided with the state's range expansion of black-legged ticks (*Ixodes scapularis)*. The Maine Center for Disease Control and Prevention (MECDC) reported 662 cases of anaplasmosis in 2017, a 604% increase from 2013's 94 cases. In contrast, there was a 17% increase in Lyme case reports from 1,384 in 2013 to 1,619 in 2017. We asked whether the increase in anaplasmosis cases has reflected increased transmission, increased testing, or both. Increased testing effort may reflect increased clinician and patient awareness as well as ready availability of tick-borne disease (TBD) panels that detect multiple pathogens, including Anaplasma PCR (or, infrequently, antibody to Anaplasma). Use of these panels may lead to detection of inapparent or mild *Anaplasma phagocytophilum* infections.

Methods: We mapped the incidence of Ap by county, produced box-and-whisker plots of age by year to check for entry of younger patients, plotted histograms of showing frequency of Ap case data by week within each year to visualized seasonality of cases, We counted the number of TBD panels that test for Anaplasma infection ordered by Maine clinicians from Mayo Medical Laboratories and NordDx, and compared statewide testing effort and human Ap incidence

Results: Statewide, Ap incidence increased 449% from 2013 to 2017, with a 638% increase in the coastal and interior counties versus 318% in the north, west, and Downeast counties. Lincoln and Knox counties in the midcoast had the highest human anaplasmosis incidence, ranging from 29 in 2013 to 278 cases/100,000 in 2017. Mayo Medical Laboratories and NordDx accounted for 72% of reports of anaplasmosis-positive tests to the Maine CDC, 2013-2017. Test use rose from 773 in 2013 to 5,802 in 2017, a 651% increase. Pediatric cases appeared in 2014 and became more common thereafter. We also found a bimodal distribution in cases that corresponds with spring and fall peaks in adult *I. scapularis* abundance seen in Maine.

Conclusion: The rise incidence of anaplasmosis in Maine may be explained in part by adoption of "tick panels" as a frequent diagnostic test in persons with febrile illness. Increased detection of less severely ill persons, i.e., pediatric cases, supports this conclusion. However, the expanding range of *I scapularis* in Maine likely contributes to a rise in cases in emerging areas.