

Pike County Tick Borne Disease Base Line Study

Background

Tick borne diseases (TBDs) affect hundreds of thousands of people worldwide. Ticks and the infectious organisms they carry have always affected humans and domestic animals and they continue to be a global health threat. Numerous bacterial, viral, and protozoan agents can be passed from a tick vector to a human or animal host causing disease and even death (Jongejan and Uilenberg 2004). Screening of ticks for pathogens using molecular epidemiological tools can be used to determine the prevalence and endemicity of tick borne pathogens in particular geographic areas. The proposed project will identify tickborne pathogen infection rates in Pike County, PA. This project will utilize molecular techniques as a means of exposure diagnostics for emerging and established tick borne pathogens.

A prior pilot study conducted in Milford Borough PA that tested for three pathogens (*B. burgdorferi*, *B. microti* and *Bartonella* sp) identified 45 percent of adult blacklegged ticks carry a tickborne pathogen with a minimum of a 3 percent co-infection rate. Co-infections and polymicrobial transmission can cause complications in diagnosing and treating a tickborne disease. Limits to this study include the number of analyzed pathogens and the small study area. The pilot study identified the need to assess TBD infection rates County wide. Studies have identified co-infection rates of Lyme disease with Powassan virus (Knox et al. 2017) at 17 percent and with Anaplasmosis at greater than 16 percent (Tokarz et. al. 2010). Analysis of these pathogens could increase the infection rate in a localized tick population. This successful Pilot study identified the need for the program to be expanded to a county-wide effort.

There are 30,000 cases of Lyme disease reported yearly in the U.S., but recent studies indicate that the actual number of people infected may be up to 300,000 a year, and continues to increase yearly (CDC 2016). Understanding prevalence rates of tickborne pathogens directly contributes to increased awareness of high-risk areas and the need for human and animal protection against tick bites. In recent years, PA has reported the highest number of Lyme disease cases in the U.S. with over 7,351 cases in 2015 (CDC, 2016). Human babesiosis and anaplasmosis (HGE), both emerging TBDs in the northeast, are reported over 1,000 times in the U.S. each year (CDC 2016). Furthermore, Powassan virus cases have been increasing in PA and NJ over the last two years. Currently, there are no vector studies in PA to determine the prevalence of Powassan virus. This study will include Powassan among the testing parameters. The purpose of this project would give a baseline understanding of pathogen prevalence and co-infection identification within Pike County PA.

Project Specifics

Testing of tickborne pathogens will be conducted by the Northeast Wildlife DNA Laboratory of East Stroudsburg University (NEWDL). Pike County has approximately 546 square miles of land cover which will be divided into 10 collection grids. Collection grids were selected to provide a comprehensive division for analysis. The NEWDL, and volunteers of Pike County, collect 100 ticks from each grid. Locations for tick collections in each grid will be selected based primarily on presence of tick habitat and human traffic. All ticks will be tested using Real-time PCR analysis using validated assays established by the NEWDL.

The information collected through this study will provide a base line for tick borne diseases that are prevalent in Pike County and what percentage of ticks carry those diseases and co-infections. After the base line is determined, the Pike County Tick Borne Disease Task Force, along with the Pike County Commissioners, will use this information to educate the medical community on what diseases are prevalent so the residents and visitors of Pike County can get appropriate treatment. In addition to educating local doctors, this information will be shared with local and state officials in an effort to encourage better legislation to; 1) mandate increased and more efficient reporting of tick borne diseases, 2) mandate doctors take continuing education courses on tick borne diseases, 3) advocate that insurance companies cover treatment of tick borne diseases, and 4) increase funding to support programs to help prevent the transmission of tick borne diseases.

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