Understanding the life-cycle of the NH Deer Tick

Lyme disease is the tickborne disease of greatest importance in NH. However, the same prevention measures will work towards minimizing risk of infection for all four diseases withdocumented transmission in NH since they share a common vector (the blacklegged tick) andreservoir hosts. Identifying and understanding the blacklegged tick life cycle, the pathogens and reservoir hosts is critical to understanding the retention and transmission of Lyme and other tickborne diseases in NH.

The blacklegged tick has a two year life cycle involving multiple reservoir hosts. A reservoir host is an animal that is capable of sustaining a large enough population of a pathogen in its blood, without displaying significant negative effect, to allow a vector to become infected when it feeds to take a blood meal. Should the animal become ill from the pathogen and either die or be eaten by a predator, it would reduce its ability to function as a host as it would reduce its availability to questing ticks. Similarly, if the pathogen does not reach high enough levels in the host's body, then transmission of the pathogen from the reservoir to the vector will not occur. Understanding the roles that are played by different hosts is an important component in identifying appropriate control methods.

The main, and shared, reservoir host for the four tickborne diseases known to be transmitted in NH is the white footed mouse. Chipmunks, shrews, voles and birds, including the American Robin, have also been identified as reservoirs for Lyme disease, although are of lesser importance. Wild rodents have been identified as possible reservoirs for anaplasmosis and babesiosis; woodchucks, squirrels and the white footed mouse are the three known reservoirs for Powassan virus Blacklegged ticks hatch from their eggs as larvae in the summer and quest for a host for their first blood meal at that time. This is the first opportunity for the tick to become infected with one or more pathogens. Usually the hosts selected are small mammals or birds, many of which are competent, or suitable, reservoir hosts. After engorging on blood and dropping off, the tick will molt into a nymph and quest for a second blood meal in the late spring to summer. Hosts for this stage of the tick are also small mammals and birds, however humans are possible hosts. The nymph stage of the blacklegged tick is exceedingly small, about the size of a sesame seed, and is easy to miss during routine tick checks. As a result, this is the stage of the tick that is most likely to transmit a pathogen to a human. Should an infected nymph feed on a competent, but naïve (uninfected) reservoir host, disease transmission and the perpetuation of the pathogen in the reservoir host population will occur, and occur just prior to the emergence of the next crop of larval ticks allowing for the infection of a new generation of ticks. Once the nymph has fed, it molts into an adult tick to quest for the next blood meal in the fall or the following spring. See Diagram

Adults do not hibernate and will be active and questing for a host during the winter months when the ground is not covered with snow and the temperature is above 41 degrees Fahrenheit. The preferred reproductive host (host which allows them to feed enough to lay eggs) is the white-tailed deer, but other medium and large mammals will also serve as reproductive hosts, but generally not as competent reservoirs. Infection rates of adult ticks are generally higher than those

of nymphs since they have had two opportunities to become infected through prior feeding events, however, since nymphs are more likely to go undetected, the nymphs are responsible for more disease transmission and, subsequently illness.