Ticks

Ticks are small external parasites in the Arachnid family. They survive on the blood of mammals, birds, and amphibians. Both ixodid (hard-bodied) and argasid (soft-bodied) ticks undergo three primary stages of development: larval, nymphal, and adult. Ixodid ticks, such as the deer tick, require three hosts, and their life cycle takes at least one year to complete. Up to 3,000 eggs are laid on the ground by an adult female tick. When larvae emerge, they feed primarily on small mammals and birds. After feeding, they detach from their host and molt to nymphs on the ground, which then feed on larger hosts and molt to adults. Female adults attach to larger hosts, feed, and lay eggs, while males feed very little and occupy larger hosts primarily for mating.

Tick species are widely distributed around the world. However, they tend to flourish more in countries with warm, humid climates, because they require a certain amount of moisture in the air in order to undergo metamorphosis, and because low temperatures inhibit their development from egg to larva. For an ecosystem to support ticks, it must satisfy two requirements: there must be a high enough population density of host species in the area, and there must be high enough humidity for ticks to remain hydrated. According to recent studies, it was determined that certain features of a given micro-climate – such as sandy soil, hardwood trees, rivers, and the presence of deer – are good predictors of dense tick populations. Attempts to limit the population or distribution of disease-causing ticks in most areas have been largely unsuccessful.

Tick-borne illnesses are caused by infection with a variety of pathogens, including rickettsia and other types of bacteria, viruses, and protozoa. Because ticks can harbor more than one disease-causing agent, patients can be infected with more than one pathogen at the same time, compounding the difficulty in diagnosis and treatment. Major tick-borne diseases worldwide include Lyme disease, Rocky Mountain spotted fever, tick-borne meningoencephalitis, Colorado tick fever, babesiosis and cytauxzoonosis. In Ontario, the most well known tick-borne disease is Lyme disease, caused by an organism called *Borrelia burgdorferi* . Lyme is transmitted by the deer tick, Ixodes scapularis. Ixodes scapularis is dependent on the white-tailed deer for reproduction. Numerous studies have shown that abundance and distribution of deer ticks are correlated with deer densities.

Lyme disease is the topic of concern and debate in Ontario dogs. Although the infection of dogs occasionally can be transmitted transplacentally or by blood, urine, or milk, tickborne transmission is considered most common. Lyme disease is tested for using serum blood tests designed to look for antibodies to Borrelia. Ticks removed from dogs can also be sent to a lab

for analysis to confirm whether or not they are carrying the organism. Up to 95% of dogs exposed (seropositive) to Borrelia will remain asymptomatic. Some dogs appear to develop transient symptoms of fever, lethargy, and anorexia. Certain breeds such as Labrador Retrievers, Golden Retrievers, and Shelties appear to be more at risk of developing clinical Lyme disease than other breeds. This may include rare kidney complications. However, the question of whether Lyme disease truly causes concerning clinical illness in dogs is difficult to answer because there are so many seropositive dogs in endemic areas, there is no test result that proves illness from Borrelia infection, and some dogs thought to be subclinically infected could be ill from another cause. For example, there are Lyme endemic areas where 70–90% of all healthy and clinically ill dogs are seropositive, making the diagnosis of Lyme disease in individual dogs problematic. In cases where Lyme disease is suspected, antibiotics are often an effective treatment. Vaccination for Lyme disease is also available. Whether it is recommended for a particular dog depends on the dog's age, overall health, risk factors for contacting ticks (outdoorsy dog, travel to tick endemic areas), and breed. The vaccine is generally safe and effective. It is initially given in 2 injections 3-4 weeks apart, followed by yearly boosters. Whether or not to recommend vaccination can be complicated, based on the aforementioned challenges.

In Ontario we also see occasional cases of Ehrlichia, Babesia, and Anaplasma. These organisms can cause fever, lethargy, anorexia, and blood cell disturbances including severe anemia. One of the Lyme disease tests called the 4Dx is useful, as it also tests for Anaplasma, Ehrlichia, and heartworm. It takes minimum 4 weeks after a tick bite for the test to detect the disease.

In Ontario, tick season lasts from early April until periods of frost in November. Due to the slightly cooler and damper conditions, April, May, and September tend to be the months with the most ticks (tick "blooms").

Tick prevention is becoming an important part of pet ownership as ticks have become endemic in many parts of Ontario, including areas near Ottawa and west towards Kingston. Prevention in important, both to reduce the number of tick bites causing local infections and to minimize the transmission of disease. In Canada, the most effective tick treatment for dogs is a once monthly topical medication called K9 Advantix. It works by deterring the tick from biting the dog by burning its feet when it walks on the dog's skin, and also by killing the tick when it drinks the dog's blood. Most ticks will die within 4-6 hours of sucking the dog's blood, which is far less time than the tick needs to be attached to transmit disease. There is also a Preventic collar available that can deter tick bites. In general, the best way to remove adult Ixodidae is mechanically. If the tick's head and mouthparts are not attached to the body after removal, it

may be necessary to perform a punch biopsy to remove any parts remaining inside the patient. If parts are left behind, local inflammation and infection will often develop.

In summary, ticks are becoming a bigger problem in Ontario and are becoming endemic in areas bordering Ottawa. Prevention is considered important. Lyme disease is the most common tick-borne illness in Ontario and is spread by the deer tick, Ixodes scapularis. Whether Lyme disease actually causes illness in dogs is hotly debated, making decisions about vaccination and treatment somewhat complicated. Other tick-borne diseases, such as Anaplasmosis and Ehrlichiosis are uncommon, but can be life-threatening.