Ticks- What's to be done?

Introduction

Most of you reading this are likely familiar with ticks, the spider's diminutive blood sucking cousin. They're the reason you now have to tuck your pant legs into your socks when you go hiking. They're also the reason you give your canine friend more attention than they probably want when they come back from playing in the park.

There are about 900 known species of ticks spread around the world, wherever there is warmth and humidity. Turn back the dial to twenty years ago and none of us in Canada gave any thought to ticks except hearing a brief mention of Lyme disease on the American news. As of 2017, at least 25 species of tick have been identified throughout the Canada

Sadly, due to several factors including human population growth, climate change, human encroachment into nature, increase in global travel and northward tick migration, we must now face the fact that ticks are here among us, and they show no signs of ever going away.

Eastern Ontario has become a tick hot spot in North America. This may be due to a low human population density, ideal level of humidity, high deer population and a notable density of wooded areas and bodies of water (lakes and rivers). The most common tick by far in Ottawa is called Ixodes Scapularis, also known as the deer tick or the black-legged tick.

In this information handout, we will focus on the deer tick and the bacterium living within, Borrelia Burgdorferi, commonly known as Lyme Infection.

Getting to know your neighbour

A tick has a life-cycle lasting approximately two years. It is broken down into four parts- the egg, the larva, the nymph, and the adult.

When the tick is ready to move onto the next life-stage- larva to nymph, nymph to adult, it must feed on blood as the transformation process takes up a lot of energy. The act of ingesting blood is called a blood meal. Once latched on to their hosts, ticks will take about 5 days to finish their blood meal. After the meal, they will drop back onto the ground.

In the larval stage, the tick will feed on smaller animals such as squirrels, mice, shrews and birds.

In the nymph stage, they will feed on larger mammals such as dogs, cats and humans.

The adults generally prefer to feed on deer since they mate on deers. However, if no deer are available, they will happily latch onto a dog, cat or human.

After feeding and mating on a deer (or a suitable alternative), the ticks will drop onto the ground, shelter themselves from the elements by hiding under vegetation such as dead leaves and spend the winter in a dormant state. In the spring, they will emerge and the females will lay thousands of eggs.

Ticks who are unable to feed will die off before proceeding to their next life cycle.

Ticks remain active as long as the temperature is above 4 degrees Celsius. This means, during the winter, they may become active during periods of thaw.

Well, that last part was super gross, but what does that have to do with Lyme Infection?

Lyme Infection is transmitted by ticks when they bite an animal. The tick serves as a reservoir for the infection, which they will usually have gotten during their first feeding on a small mammal such as a mouse.

Ticks are unable to jump or fly. Instead they climb onto tall grass or leaves, extending the front pair of legs while they wait for the host to move close to them.

The bacterium will not immediately move into the host when the tick first attaches itself. The bacterium must change its structure in order to adapt itself to survive in the new host. There are specific proteins on the surface of the bacterial walls which undergo transformations to allow survival of the bacterium in its new host. The original surface protein is called Outer surface protein A (OspA). Once it has transformed it is known as Outer surface protein C (OspC). This process takes at least 2 days. Outer surface protein C allows the bacterium to attach to the tick salivary gland cells and pass into the body of the new host. It allows the bacterium to evade the host's immune system.

In Ontario, it is estimated that 15% of deer ticks carry Lyme Infection. This value has been calculated as an average for the entire province. A study funded by the Canadian Institutes for Health Research (CIHR) in 2017 revealed that in Ottawa, almost 30% of deer ticks were found to carry Lyme. This is twice the provincial average and has likely gotten higher in the years since the study was performed.

For there to be a risk of the Lyme Infection passing into the mammalian host, be they dog, cat or human, the tick needs to be latched on for at least 48 hours. If the tick is on for less than 24 hours, then the risk is considered negligible. Between 24 and 48 hours there may exist a questionable risk.

To summarize, for a dog to be infected with Lyme, the tick biting them must be the deer tick, it must carry Lyme and it must stay attached to the dog for at least 48 hours.

Strangely cats appear to be resistant to the effects of most tick-borne infections including Lyme. Cats can still get bitten by ticks and the bacteria can still enter their body. However, there are no reports of any naturally occurring Lyme Disease in cats where the cats become ill..

In a laboratory setting, researchers were able to cause Lyme Disease in cats which lead to arthritis with limping. This illness was only short lived and the cats naturally improved on their own without requiring treatment.

Cats can still be infected with other types of tick infections such as Tularemia and Babesia. Currently these other tick infections have only rarely been reported in cats who have not lived or traveled outside of Ottawa.

What's the big deal if my dog gets Lyme?

First, we must mention the difference between Lyme Infection and Lyme Disease. The former means the bacteria has entered the body, but having an infection does not mean the affected individual will become ill. Lyme Disease implies that the individual, be they dog or human, has become ill from the bacteria.

In reality, only about 5% of dogs who are exposed to Lyme will develop active Lyme Disease. The rest will become infected, but will be able to mount a proper immune response to eliminate the bacteria from their system.

There are many clinical signs reportedly linked with Lyme Disease. This includes loss of appetite, arthritis (causing limping), fever, depression, myalgia (muscle aches and pains), swollen lymph nodes, vomiting, diarrhea and weight loss.

When researchers recreated Lyme Disease in dogs in a laboratory setting by purposefully infecting them to study the disease, they were only able to reproduce three signs- loss of appetite, fever and arthritis. These are the only consistent effects we can attribute to Lyme Disease.

Dogs who develop Lyme arthritis will respond quickly, with full resolution of the limping with a course of antibiotics. Although the treatment standard is four weeks, most dogs fully improve within 1-3 days of starting the treatment.

Most dogs treated for Lyme arthritis are completely cured and do not have relapses later in life.

The most concerning type of Lyme Disease is a condition called Lyme nephritis. This type of Lyme Disease will cause severe kidney disease. The kidneys' most important function is filtering bodily waste from the body into urine. Over the years, there have been multiple cases of dogs, diagnosed with kidney disease, who also tested positive for Lyme.

Although there exist no statistics, the number of dogs with Lyme Disease who develop kidney disease is believed to be very small.

Multiple studies have been performed to study how Lyme could cause kidney disease. So far, the Veterinary medical community has been unable to recreate this Lyme associated kidney disease in a laboratory setting. This means the link between Lyme infection and kidney disease remains unclear.

For now, given the number of Lyme positive dogs who have developed kidney problems, we must assume that the Lyme Infection is playing a role in causing the kidney disease. This means dogs who are diagnosed with Lyme nephritis will still be treated with antibiotics.

Generally, dogs with Lyme nephritis are not cured with antibiotics. Instead, over a period of months to years the kidney disease will worsen, eventually leading to kidney failure. Dogs with Lyme nephritis will require more aggressive therapy such as intravenous fluids, medications to stop protein loss through the kidneys (one of the main signs of severe kidney disease), medications to reduce vomiting and nausea, medications to reduce high blood pressure. The more severe the kidney disease, the more health problems a patient will develop.

What can we do to help prevent ticks and infections from ticks such as Lyme?

Our team at Mer Bleue Veterinary Hospital will always be there to help reduce the risk of your canine friends being bitten by ticks or being exposed to Lyme Infection.

Humans have several measures they can take to prevent tick bites. These include wearing light coloured long-sleeve pants and shirts, and closed-toe shoes; tucking our shirt and pants; using bug spray with DEET or Icaridin; and performing tick checks when we return home after a walk or hike.

Preventing ticks from attaching themselves to dogs proves to be more challenging. Most dogs would likely object to wearing boots and a full body suit when they are outside. Additionally, as our canine friends tend to be much lower to the ground, they are at a higher risk than us of getting bitten anywhere on the body, not just the legs.

If your furry friend has sufficiently short light-coloured fur, you can perform a thorough tick check when returning home. However, if the fur is black or the fur is long, a tick check becomes less fruitful as ticks will easily be missed.

There are some steps you can take in your own home to reduce the chances of your canine friend being bitten by a tick in your backyard. This includes keeping the grass cut short, clearing areas of dead leaves and weeds, and putting wood chips in your garden.

PRESCRIPTION PREVENTIVE

The best way to prevent your furry friend from diseases transmitted by ticks, is to ensure the tick dies before it has the chance of passing on any infection.

Currently, at Mer Bleue Veterinary Hospital, we recommend a preventive called Simparica. This flavoured tablet is given once per month. It is labeled to kill five of the most common ticks in North America, including the deer tick.

The tick must bite your canine friend before it can be exposed to the medication. Almost all deer ticks die within 12 hours of being exposed.

We, at Mer Bleue Veterinary Hospital, recommend all dogs who spend time outdoors receive the preventive Simparica.

As ticks are active in temperatures above 4 degrees Celsius, we recommend all dogs receive preventive doses from April to December.

Owing to climate change, Ottawa sees more frequent periods of thaw during the winter than in previous years. Amidst the winter thaw periods of recent years, dogs have been at risk of being bitten by ticks even in the months of January to March.

Whether your canine friend will require winter (January, February, and March) tick prevention will depend on their lifestyle. If they hate the cold so much so that they only step one foot outside the door to pee, then they are likely safe.

If, however, your canine friend loves to visit recreational trails, conservation areas, forests and provincial parks in the winter, then your Mer Bleue veterinarian will strongly advise keeping them on year-round tick prevention.

It is important to note that there are other types of infectious diseases which are transmitted by ticks. Some are transmitted by the same tick which carries Lyme (the deer tick), while others by different species of ticks. These infectious diseases, which include Ehrlichia, Anaplasma and Rickettsia, are beyond the scope of this discussion. They are currently very infrequent in eastern Ontario and are mostly diagnosed in dogs which have moved from another part of Canada or another country entirely, particularly the United States or a Caribbean nation.

With climate change and migration of other tick species into the Ottawa area, we may see these other infections become a more significant issue in the future.

Dogs who travel outside of Eastern Ontario, particularly to the southern United States, are at a much higher risk of being infected by these other tick infectious diseases such as Ehrlichia, Anaplasma and Rickettsia. If your canine friend spends the winter with you down south, we strongly advise keeping them on Simparica, to help kill any biting tick.

VACCINE PREVENTIVES

Certain pharmaceutical companies produce vaccines which can protect dogs against Lyme infection. Unlike vaccines protecting against other diseases, Lyme vaccines kill the bacteria before they reach the recipient of the vaccine.

Lyme vaccines target two proteins which are part of the cell wall of Borrelia Burgdorferi (the bacterium causing Lyme). We previously mentioned these proteins: Outer surface protein A and Outer surface protein C. After receiving the Lyme vaccine, a dog's body produces antibodies targeting these two proteins. When the tick bites the vaccinated dog and begins its blood meal, it will ingest these antibodies. Once inside the tick, the antibodies kill Borrelia Burgdorferi (Lyme) before it has a chance to migrate into the vaccinated dog's bloodstream.

It can be a useful addition to tick prevention. This is particularly true if you are concerned about forgetting to give some of the tick prevention doses. It is common for families to fail to remember to give a dose due to the infrequent dosing schedule of one dose per month.

The Lyme vaccine only provides protection for one year. After this time period, the protection offered by the vaccine rapidly drops. So it is very important to not wait more than 12 months between vaccine boosters.

If your canine friend spends a lot of time at a cottage, camping, in recreational trails, conservation areas, forests and provincial parks then they are at increased risk. Areas around the northern shore of Lake Ontario such as the Thousand Islands, the Kingston area and Prince Edward County, have an even higher number of ticks than in Ottawa. Dogs spending a lot of time in these areas will also benefit from the Lyme vaccine.

Ticks prefer areas with a lot of undergrowth, tall grass and other low lying vegetation (schurbs, bushes). So If your canine friend prefers urban areas with sidewalks and paved trails surrounded by short grass then a tick prevention medication alone is likely to be sufficient.

A Lyme vaccine can be an important tool in preventing Lyme Infection and Disease in our higher risk canine companions. However, as there exist other tick infections, none of which have their own vaccine, a monthly tick prevention remains the most important tool.

NON-PRESCRIPTION PREVENTIVES

It must be noted that there exists over-the-counter options for tick prevention. These products can be purchased in pet stores and generally contain permethrins, which are insecticides. They are applied directly onto the skin of your furry friend. The most commonly available of these topical preventives is called K9 Advantix. Originally only available through a veterinarian, in the past few years it has become available through pet stores.

It is important to be careful when using products containing permethrins as it is highly toxic to cats and children. Once the permethrin containing product has been applied to your canine friend, it is important to prevent direct contact with the portion of the skin containing the topical preventive for at least 24 hours.

There exist a large number of naturopathic and homeopathic products in pet stores or online that claim to be effective in protecting your furry friend against ticks. These products usually contain various ingredients including essential oils, dried flowers and herbs. Although these products have little to no risk of causing side-effects, they also are not effective. These products have no peer-reviewed scientific data to support their effectiveness in killing or preventing tick bites.

What about the side-effects associated with tick preventives?

PRESCRIPTION PREVENTIVE

The most common tick preventive prescribed by veterinarians is from a class of drugs called Isoxazolines. This includes Simparica, the preventive prescribed by your Mer Bleue veterinarian. It also includes other preventives your furry friend may have used in the past including Bravecto and Nexgard.

In the ten years since these preventives became available there have been sporadic reports of dogs and cats having seizures after receiving their dose.

Isoxazolines were created to specifically target the nervous system of invertebrates (including insects such as fleas and arachnids such as ticks). Isoxazolines overstimulate the nervous system which leads to paralysis and death of the invertebrate.

Even though it was created to affect the nervous system of invertebrates, some dogs or cats with pre-existing neurological conditions are at higher risk of exhibiting side effects of Isoxazolines. This risk is extremely low, but has been reported including tremors and seizures. Since these preventives were introduced ten years ago, there have been no reported incidences of paralysis or death following administration of these drugs.

The Food and Drug Administration (FDA) in the United States has published a fact sheet for families. We have posted the link below.

https://www.fda.gov/animal-veterinary/animal-health-literacy/fact-sheet-pet-owners-and-veterinarians-about-potential-adverse-events-associated-isoxazoline-flea

Simparica and other such tick preventives are considered the most effective tick preventives and remain extremely safe. If you still have concerns regarding the safety of their use, please don't hesitate to contact us at the Mer Bleue Veterinary Hospital.

NON-PRESCRIPTION PREVENTIVES

It is important to note that the other commonly used tick preventive, Permethrins, has also been associated with side-effects. Permethrins kill ticks by affecting their nervous system by causing muscle spasms, paralysis and death.

Cats are extremely sensitive to the effects of permethrins since their livers lack certain enzymes needed to metabolize the drug. Any product containing more than 1% permethrin is considered toxic to cats.

As these treatments are applied directly onto the skin, there have been rare reports of sensations of tingling, burning, itching or numbing on the skin where the treatment was applied. There are also reports of small breed dogs developing muscle tremors and even seizures following application of a dose.

VACCINE PREVENTIVES

The Lyme vaccine has a rare chance of causing an allergic reaction after being administered. Allergic reactions to vaccines generally include angioedema (swelling) of the face, urticaria (hives) over the body, fevers, and digestive issues (vomiting, diarrhea).

How can I know if my friend has been exposed to Lyme?

The best way to answer this question is with a blood test called a 4DX. This blood test detects four infections: Heartworm (please refer to the heartworm handout for more information on this parasite), Lyme, Anaplasma and Ehrlichia. The last three are bacterial infections transmitted by ticks.

This blood test can only detect antibodies against Lyme. This mainly tells us whether or not your canine friend has had a Lyme Infection but cannot tell us if they have Lyme Disease.

Luckily, the Lyme vaccine does not affect the results of the 4DX test.

Most dogs who test positive for Lyme will have eliminated the infection from their bodies without getting sick or requiring antibiotics.

There exists a test which measures the quantity of antibodies against Lyme. This test is of limited use since a higher amount of Lyme antibodies cannot predict whether your canine friend will become sick with Lyme Disease.

Whenever we are faced with a 4DX blood test positive for Lyme, we will take the appropriate steps to ensure your friend does not have a Lyme Disease. First of all, we will search for any observable evidence of Lyme Disease such as arthritis (causing limping), decreased appetite or energy, fever or swollen lymph nodes.

We will also recommend a urine and blood test to confirm there is no indication of kidney disease. If the urine and blood test results are normal, then your Mer Bleue veterinarian will be comfortable in stating your canine friend does not have Lyme Disease or Lyme nephritis.

A positive test for Lyme antibodies, even in the absence of Lyme Disease or Lyme nephritis, proves that at some point in the past, your canine friend was bitten by a tick carrying Lyme.

It also means that your canine friend is at risk of being bitten by other ticks in the future. Therefore, it will be strongly advised that any dog not already on a tick preventive be started as soon as possible to reduce further risk of exposure.

Conclusion

Hopefully the information we have provided will help you make an informed decision about which tactic you will use to protect your canine friend against tick transmitted diseases.

At the Mer Bleue Veterinary Hospital, we will always advise all of our canine patients to be on a tick preventive. We, at Mer Bleue Veterinary Hospital, believe in the prevention of disease whenever possible. The tick preventives we prescribe at Mer Bleue Veterinary Hospital have proven to be extremely safe. Their effectiveness in preventing tick-borne diseases far outweighs the risk of observing serious adverse reactions.

If you have any further questions or concerns, please do not hesitate to contact us at the Mer Bleue Veterinary Hospital.

Have a wonderful day.