2007 has been a rough year for dogs. I personally have seen and been involved in numerous cases of tick bourne illnesses. If any of this information can help save a dog, it was well worth the effort of writing it.

This month in DVM magazine there was a listing of tick viruses by state and all 3 major viruses are now being found in 48 of the 50 states. Obviously lyme is more prevalent in New England, but we have lots of cases of it here in texas now. Ehrlichia is really bad here too. I think that the hurricanes have made the viruses more widespread in the last couple of years but that is just my theory, not proven fact ;) The tick viruses attack the spleen first and also the liver. most vets look for the common signs of Lameness and fever before testing for or even thinking about tick bourne illness. Lameness comes after the illness has set in, in the mean time the virus that the tick transmits is already in the blood stream and will show up as an enlarged spleen, dark spots on the spleen, impairment of the liver (increasing the liver enzymes) and even cardiac involvement, which is what happened to gambler about 2 years ago. My cardiologist picked up on it when gambler had a funky holter, the beats didn't make sense to her so when she was working him up she ultrasounded his abdomen and found his spleen and liver were enlarged. She told me to send a full tick panel and it came back as Rocky Mountain Spotted Fever and Ehrlichia. Casey's liver enzymes are basically spilling over into his blood stream because his liver is working too hard to filter out the toxins that the liver filter.
Here is the full list of sypmtoms of tick related diseases. also important to make sure the vet tests, even if he thinks that the illnesses aren't prevalent in the area, and some great info incase you ever need it, hope you don't. Gambler was lucky we caught it before he was showing symptoms, Dutch a dog I had years ago was not lucky, he died from complications of meningitis due to lyme disease. We treated him hard, but it was still too late. Did learn that if a dog is showing any of the symptoms DO NOT GIVE STEROIDS! They supress too much and the ilness will take over.

2. What are the signs and symptoms of tick diseases?

anorexia (lack of appetite)
weight loss
fever
lethargy (mild to severe)
discharge from the nose or eyes (in puppies, sneezing or clear nasal discharge)
diarrhea (may contain blood or raspberry gel-like component) cough-deep or merely hacking
neurological signs including seizures, repetitive obsessive/compulsive actions such as chewing fur and/or licking legs, un-coordination or palsy depression
vomiting bile (yellow and possibly frothy) stained fluid
hemorrhaging even when blood count looks normal
lightening of nose color
nosebleeds
blood clotting problems-even with normal CBC (complete blood count)
edema (swelling) of the extremities
muscle wasting
chronic ear and skin infections that do not respond to normal treatments
low platelet count (thrombocytopenia)
ocular signs including bloodshot and glassy eyes, anterior uveitis, retinal hemorrhages, dilated pupils, photophobia
low WBC count (leukopenia)
elevated WBC count (leukocytosis)
regenerative or non-regenerative anemia
arthritis, unexplained lameness in one or all legs
weakness

pallor (pale gums or tongue)
incontinence
enlarged liver, spleen
liver, kidney failure
elevated liver enzymes or kidney function tests
increased thirst and urination
neck or back pain
bleeding under the skin or a rash (purpura)
enlarged lymph nodes
irreversible bone marrow suppression
protein in urine (proteinuria)
prostatic infections and/ or enlarged prostates in young, intact dogs
Sometimes the symptoms are few and subtle to see in the later stages of tick disease (sub-clinical or chronic). It is unlikely a dog would have all of the symptoms, as the list is quite long.

3. What is meant by the terms acute, sub-acute (sub-clinical) and chronic when referring to tick disease?

ACUTE: Generally, in the acute phase of illness, 1-4 weeks post infection, the dog may present with a flu-like illness. Fever, lethargy, depression of appetite, diarrhea and/or lameness may be present. The dog may act like it is very painful to be touched and will yelp when picked up or when played with. The laboratory profile will be variable, showing decreased red blood cells and increased white blood cells (WBC) and/or platelets. Alkaline phosphatase (liver enzyme) may be elevated. Immunologically competent dogs may be able to eliminate the infection without treatment, however, antibiotic therapy is very effective during this stage of illness and is recommended to completely eliminate the organism.
SUB-ACUTE (SUB-CLINICAL):
Untreated, the disease may move into the sub-clinical phase. The dog's body weight normalizes and laboratory abnormalities may be quite subtle. Thrombocytopenia (low platelets) may or may not be present. This phase of disease can last for months or years as long as the dog is not subjected to something that causes undue stress. The parasite is essentially living with the host in stasis; not overpowering the dogs immune system. CHRONIC:
However, if this balance is disturbed by environmental conditions, concomitant infections (combination of diseases), immuno-deficiency, splenectomy, surgery, stress, excessive work, pregnancy, immunosuppressive therapy (including corticosteroids like Prednisone), the organism can gain the upper hand and the dog enters the chronic stage of illness. Because the organism is possibly sequestered in an organ or organs (bone marrow, spleen, liver, etc.), it is harder to treat effectively. Immune capabilities are impaired (like ability to make antibodies). Sometimes, when a dog has entered the chronic stage of tick disease, there is no form of effectual treatment and death can occur.

4. Can tick disease mimic other medical conditions?

Yes. Ehrlichiosis may be confused with:
reticulosis
systemic lupus erythematosus
brucellosis
blastomycosis
thrombocytopenia
endocarditis
immune mediated disease
myelophthisis
cancer of spleen, liver or brain
Valley Fever

plasma cell myeloma or lymphosarcoma
leukemia
Babesiosis may imitate:
hemolytic anemia
kidney failure
vague blood disorder
thrombocytopenia
"doggie aids"
autoimmune disease(s)
Von Willebrand's disease
leukemia
DIC (disseminated intravascular coagulation - severe blood clotting disorder) The above can be documented in the scientific literature. Unpublished data on approximately 30 Samoyeds who have been followed for the last couple of years, who titered positive to one or more tick diseases, and who had clinical symptoms consistent with tick disease, had previously been diagnosed with IBD (Inflammatory Bowel Disease), pancreatitis, chronic giardiasis, liver failure (including liver cancer), obsessive/compulsive fur chewing on extremities, hypothyroidism and reproductive problems including abnormal seasons, recurrent vaginitis and pyometra in bitches and enlarged prostates and penile discharge in dogs.

5. What routine lab tests can be indicators of possible tick disease?

Laboratory findings vary depending upon the stage of illness. The CBC (Complete Blood Count) may be within normal limits, or can show:
low hemoglobin or very high-i.e. 17-19 range low PCV or extremely high PCV-i.e. 50 or greater platelets range from 140,000 and below, to 385,000 or higher WBC's 8,000 or less, or the reverse-i.e. 18 to 40,000. On the chemistry panel, liver, kidney or pancreatic enzymes may be elevated. Globulin and total protein values may be low if the dog is immuno-suppressed and is unable to make antibodies.

6. How many strains of Ehrlichia are there?

Lots of work is currently being done in the field of Ehrlichiosis research due to the fact that this is an emerging pathogen for humans. While it was once thought that each strain was species specific, as more research is being done, they are finding that there is much crossing over between strains and their target vertebrate hosts.
The Ehrlichial strains that infect the monocytes are:
E. canis (dog and other wild canids-- worldwide distribution)
E. chaffeensis (humans, deer, dog--US, Europe, Africa, S. & Central America)--also called HME
E. sennetsu (human-- Japan, Malaysia) [Note: E. sennetsu has been renamed Neorickettsia sennetsu21]
E. risticii (horse, dogs, cats--, North America, Europe) [Note: E. risticii has been renamed Neorickettsia risticii21]
The Ehrlichial strains that infect granulocytes (segmented white blood cells) are:
E. equi (Horse, dog, humans, rodents--US, Europe)--The human strain is referred to as HGE
E. phagocytophila (sheep, cattle, bison, deer---Great Britain, Europe)
Note: E. equi, HGE and E. phagocytophila have been combined into a single genus specie - Anasplasma phagocytophila.21 E. ewingii (dogs, humans--North America) One strain of Ehrlichia infects platelets (cells associated with blood clotting): E. platys (dogs and wild canids--N. and S. America) - Note: E. platys has been renamed Anaplasma platys.21

7. Which ticks in the US transmit disease?

The two ticks now known to transmit Lyme in the US are Ixodes scapularis (NE and S US-- formerly called I. dammini) whose common name is the deer tick; and I. pacificus (common name- western black-legged tick) in the W US including all of the W coast states, plus Arizona, CO and Nevada. However, what is important for transmission in any locale is 1) the availability of animal reservoirs--deer and small mammals--the contact with domestic animals and humans is incidental to that. And 2), how many of the ticks actually carry the infection. Literature reports show that in Connecticut where Lyme is endemic, the population of I. scapularis ticks that carry Lyme ranges from 10 to 30 % depending on which reports you read. But, in studies done in W coast I. pacificus habitats, infection rates were only in the 1 to 3% range. So the odds of transmission drop accordingly.
Rocky Mountain Spotted Fever (RMSF) is transmitted by both Dermacenter variabilis (american dog tick-occurs W of the Cascades and Sierra Nevadas, from Nebraska to the Atlantic and in E Canada and Mexico) and Dermacentor andersoni (wood tick-range is Nebraska westward to the western mountains-Cascades and Sierra Nevadas, in northern NM and Arizona and in W Canada). The name RMSF is somewhat misleading because the disease has been reported in all states except Hawaii and Vermont.
Human monocytic ehrlichiosis (HME), caused by the organism Ehrlichia chaffeensis, is transmitted normally by the Lone Star tick, Amblyomma americanum (distribution is southern USA from TX to MO to the Atlantic coast and ranges northward into New Jersey) and Dermacenter variabilis (american dog tick). This disease has been reported in thirty states in humans. Reservoirs include white-tailed deer, dog and small rodents. The monocytic form of this disease in canines is called E. canis and it is transmitted by the brown dog tick or kennel tick, Rhipicephalus sanguineus, with worldwide distribution. E. platys (now called Anaplasma platys) is also transmitted by the brown dog tick.
E. ewingii, which causes canine and human granulocytic ehrlichiosis, is transmitted by the Lone Star tick, Amblyomma americanum (distribution is southern USA from TX to MO to the Atlantic coast and ranges northward into New Jersey).
HGE (now called Anasplasma phagocytophila), human granulocytic ehrlichiosis, is transmitted by the tick I. scapularis, which also transmits Lyme and Babesiosis. Other vectors include I. pacificus and I. ricinus (Europe). The primary reservoir for HGE is thought to be the white-footed mouse.

8. Which diseases should my dog be tested for?

There may be some variability depending on the locale where the dog resides, was bred or has traveled. The following would constitute a good screen:
Neorickettsia (Ehrlichia). risticii E. canis Anasplasma phagocytophila (E. equi) Babesia canis Lyme RMSF - Rocky Mountain Spotted Fever

9. Where can the testing be done?

For titers to the Ehrlichial strains (canis, equi and risticii) and Babesia canis and B. gibsonii: Have your vet call first to make arrangements as Dr. Kakoma is doing this testing as part of an ongoing research project.
Dr. I. Kakoma
ATTN: Hemotropic Diseases Laboratory
2836 VMBSB, 2001 S. Lincoln Ave.
College of Veterinary Medicine
University of Illinois Urbana, IL 61802
Cell Phone: (217) 766-1019
Office Phone: (217) 333-1859
Fax: (217) 333-0346
E-mail: kakomai@uiuc.edu
Lyme and RMSF:
MSU College of Veterinary Medicine

The Diagnostic Center for Population and Animal Health
PO box 30076
Lansing, MI 48909
517-353-2296

Have your vet call the lab to find out how much whole blood and/or serum they will need to perform the titers for the strains requested and the pricing for each. Find out the preferred method of shipping and the preferred day of the week to send the specimens. The laboratories can also fax your vet the requisition form to submit with the sample. For Lyme testing, be sure to request the Western Blot test, not just an IFA or ELISA screen--particularly if your dog has had the Lyme vaccine.
Testing for tick disease is not inexpensive. Having the titers done at competent laboratories will save money in the long run.

10. What will the result of the titer tell me?

The titer result will need to be interpreted by the veterinarian who has examined the dog in conjunction with the referral laboratory's guidelines for positive and negative titer results. Generally, the following is true:
Negative titer result: Technically, a negative titer means the dog does not have detectable antibody to the strains tested. There are several reasons this could occur: The dog is in fact negative and has not been exposed to a tick borne disease. The titer test was done too soon --it can take 1-2 weeks after being infected before IgG antibody levels are detectable.
Tick borne diseases can depress the dogs immune system so antibodies are not being made; therefore none are detected with the titer test. In the acute stage of illness, it is easier to detect antibody--in fact a rise in antibody titer may be discernible with repeat testing. However, unfortunate though it may be, often dogs are not tested in the acute stage of disease. Once in the sub-acute or chronic stage of illness, titer results are not uncommonly negative.
The titer was negative because the titer was not done with correct antigen. Example: E. canis and Neorickettsia (Ehrlichia risticii) were tested, but the dog actually has Anaplasma (Ehrlichia) platys.
Positive titer results: A positive result indicates that the dog has, at some point in its life, been exposed to the strain of tick disease for which it was tested. (Note: Exposure to more than one strain is possible.) With clinical symptoms consistent with tick disease, one option is to treat until titer and symptoms disappear. This may require several courses of treatment.
A positive result without symptoms consistent with tick disease, probably bears watching and repeat titers should be done at a later date or if symptoms later occur.

11. How do you remove an attached tick?

Do not use alcohol, nail polish, hot matches, petroleum jelly, or other methods to remove ticks. These methods may actually traumatize ticks causing them to regurgitate their gut contents. Essentially, you don't want to do anything to make the tick expel its gut contents into the individual or animal--this greatly increases the chance for infective organisms to be transmitted. You also don't want to crush the tick after removal and get the contents of a potentially infected tick on your hands.
The recommended way to remove an attached tick:
Wear gloves and use a tweezers. Caution is advised because most diseases that ticks carry can also be transmitted to people. Grab the body of the tick with the tweezers and firmly pull the tick straight out, DO NOT TWIST OR JERK. Do not puncture the body of the tick. If it looks like some of the tick did not come completely out (the tick's mouthpart has a barb on it to make removal more difficult), use an alcohol sterilized needle to remove the remaining pieces. Cleanse wound with soap and water, and then alcohol. Save the tick in rubbing alcohol (the alcohol quickly kills the tick) for future identification and testing**, if necessary. Date the bottle. Drowning a tick in water does not work--they can even survive

flushing down the toilet.
Mark the date on the calendar; this could be useful information if the dog starts showing symptoms consistent with tick disease. Believe it or not, I keep an empty medicine bottle half filled with rubbing alcohol handy and drop the ticks in it to kill them.
**Testing of the tick for disease organisms can be done with a PCR (Polymerase Chain Reaction) test. Check with the laboratory that will be doing the testing before placing the tick in alcohol as this may interfere with the test procedure. Save the tick in a sealed ziploc bag with a little moisture, without alcohol, until this information can be determined. Many state health departments are equipped to handle this type of testing.

12. What preventive measures are available to avoid ticks on my dog?

Avoid tick prone areas--ticks love low shrubs and grasses.
Most Samoyed owners have never seen a tick on their dogs--but how good have they really looked? With all the fur, a tick is very easy to miss. Check for tick attachment as soon as you return from an outing. Line comb or use the hair dryer to examine all areas closely. Depending on the type of tick and the disease it carries, the attachment and feeding for several hours to several days is necessary to transmit disease. So prompt removal is a must.
Prophylactic measures: A couple of products are now available (Please check with your Veterinarian about whether these would be good products to use on your dog; I am not recommending the use of either, that would be your decision to make.).
Frontline® (Rhone-Merieux, Inc.) spray or Topspot--The active ingredient is Fipronil which is a neurotoxin specific to invertebrates (including fleas and ticks); it over stimulates the flea or tick's nervous system causing convulsions and death within a few hours for fleas and within 48 hours for ticks.
Some tips for a better application:
The active ingredient in Frontline®, Fipronil, needs to bind to the hair follicles/sebaceous glands and from there it is released over a period of time to provide flea and tick protection. So it is important to get the product down to the skin of the dog, rather than just soaking the coat with the spray. I generally line comb the dog, separate the fur well, and spray.
It is better to wait at least two days AFTER a bath before applying the Frontline® to allow the natural oils to return to the skin to aid in the process of spreading the Fipronil over the surface of the dogs skin . By the same token, don't spray the product on and then bathe the dog within 48 hours or a lot of the product goes down the drain.
The Frontline® spray is better to use than the Frontline Topspot® (gel applied between the shoulder blades) in heavily flea or tick infested areas.
If for any reason the dog reacts negatively to the Frontline®, contact your veterinarian immediately. Bathing the dog with a shampoo containing Benzoyl Peroxide is recommended to completely remove the Frontline®.
Per the manufacturer, Rhone-Merieux, Frontline® has been shown to be effective against fleas for 90 days and against ticks for 30 days and may be re-applied every 30 days if necessary. Normal bathing of the dog should not remove the product during this time--UNLESS--you use one that contains Benzoyl Peroxide.

Preventic ® Tick Collar (Virbac, Inc.) for dogs:
This collar contains the amitraz, which is an arachnicide, not an insecticide (it will not kill fleas). Amitraz appears to interfere with the ability of the tick to actually feed on the pet by paralyzing the mouth parts of the tick. It will also kill ticks that have already attached, but this could take 24 to 48 hrs. The collar also must be worn for 24 hrs before it starts to work. Amitraz is not systemic-- it mixes with the natural oils of your dog's skin and spreads from head to tail.
VERY TOXIC IF INGESTED -- This sounds like it wouldn't be a problem, however, consider multi-dog households, especially if one of the dogs is prone to playing with the other dogs collar or if one of

the dogs chews things up frequently. Also, to fit the collar, you cut off the excess length--be sure to dispose of this properly. Should your pet eat any part of the Preventic ® collar, go to the vet immediately. Symptoms of toxicity include vomiting, white gums and unsteadiness. The vet can administer an antidote for it called Yobine® (yohimbine hydrochloride). WARNING: Do NOT put on dogs who are taking the medication, Anipryl™, without FIRST getting your veterinarian's OK.
This collar DOES NOT prevent fleas, it is only for ticks. Rain will not reduce the effectiveness of the collar, however, bathing or swimming should not be done while the collar is on.
Do not use on cats. Some dogs appear to have individual sensitivity to the collar. If your dog becomes lethargic or irritable, remove the collar and report the reaction to your vet immediately.

13. What is used to treat tick disease?

Ehrlichiosis: Doxycycline*** (a semisynthetic tetracycline) at 10 mg/kg of dog's weight (2.2 pounds = 1 kg), twice per day given 12 hours apart for 6 weeks or longer. Sometimes more than one course of therapy is necessary. Doxycycline should not be given with food (milk or yogurt) or supplements containing calcium iron or magnesium (like antacids) because these agents will interfere slightly with the absorption of the antibiotic. (Allow at least two hours pre or post doxycycline administration.) Do not give Doxycycline on an empty stomach--so administer the medicine with food or 30-60 minutes after the dog has eaten. Wrapping the pills in piece of bread often helps alleviate the upset stomach. Another thing some owners have found helpful--if you can do it with your work schedule--is to keep the dog somewhat active for a while after giving the doxycycline--if the dogs go and just sleep right after administering the doxycycline--the medicine sits in one spot in the stomach and seems to be more irritating to the stomach lining.
***PLEASE NOTE--This dose of doxycycline is at twice the normal published therapeutic amount. Only the veterinarian caring for your dog can make the decision about what dosage to use. Have your vet contact a veterinarian familiar with treating Ehrlichiosis to discuss treatment options.
Babesiosis: The current drug of choice, Imizol® (generic name- Imidocarb Dipropionate), was FDA approved (11/97). It's success rate as stated in research papers is 95 - 98%. While Imizol is the least toxic of all the anti-babesial drugs, potential side effects that can occur within one hour of injection include: pain or irritation at injection site, nausea with vomiting, excessive drooling and salivation, diarrhea, and muscle tremors and twitching. Imizol could potentially cause nephrotoxicity in a dehydrated dog. At least one death of a greyhound has been attributed to Imizol injection. A reduction in side effects has been seen by injecting the Imizol subcutaneously, rather than into the muscle.

14. How do you identify the type of tick?

There are a couple of good websites that have images and video clips of ticks. University of Rhode Island Tick Research Laboratory Iowa State Entomology Image Gallery Also, most county extension services have a staff entomologist who could identify the tick.