

## BIANNUAL CHF PARENT CLUB CONFERENCE, 2017

By Laurie Boles

The AKC Canine Health Foundation holds a Parent Club Conference every two years. This year, it was held August 11-13. Each conference invites one Parent Club representative to attend, and also, any other interested parties on a first come, first serve basis. Veterinary medical professionals are awarded CE credits, and this year, they accumulated 14.5 CEs. I was honored to attend as the representative for the AEDCA Parent Club.

Sessions for this year's Conference covered a wide array of topics, with concentrated emphasis on Lymphoma, Canine cognition, Nutrition, Tick-borne diseases, Genetics, Epigenetics, and Genetic testing, Infectious disease, and Reproduction. Several of the reports overlapped several topics. All of the reports were fascinating and informative, however the topics that relate closest to our AEDs are described below:

### **NUTRITION:**

#### The Effects of an Omega 3 Fatty Acid-rich Diet With Rehabilitation

by Dr. Wendy Baltzer, DVM, PhD, DACVS

Dr. Baltzer described a study that involved dogs who underwent the most common canine knee surgery, TPLO. Historically, dogs take approximately six months to recover. Rehab is used to achieve extracapsular repair, increased percentage of body weight-bearing ability (40% per leg is considered "full weight-bearing"), vertical impulse (how much body weight over how much time), increased thigh circumference, and ROM (range of motion). NSAIDs are traditionally used, but although they temporarily decrease pain and inflammation, they don't slow arthritis progression.

Once arthritis starts, it cannot be halted, therefore the goal is to slow it down. Omega 3s were proven to slow arthritis and improve weight bearing.

A new diet available by prescription from Purina, is Purina JM . It is very high in Omega 3s (approximately 180mg/kg), and the protein content is 31%. It increases muscle mass, and in the study, dogs on JM reached normal weight bearing much faster than the control dogs. The dogs on JM had significantly less lame time, and those dogs on JM and physical therapy achieved normal weight bearing in only eight weeks.

Note: both rehab and the JM diet delayed bone healing (up to 6 months after surgery), however, even though their bones took longer to heal, these dogs were running around more, had fewer complications, and less arthritis. No kidney problems were found in increasing the protein in the diet.

Chemotherapy and Probiotics

by Dr. Korinn Saker, DVM, PhD, DACVN

Dogs receiving chemotherapy for cancer can suffer from severe diarrhea, loss of appetite, nausea, and weight loss. These side effects can be severe enough to require that the chemotherapy be changed in ways that make it less effective. The researchers evaluated whether the gastrointestinal adverse effects of chemotherapy could be minimized by providing oral probiotic supplementation. This study involved dogs receiving doxyrubicin, and pointed to benefits from oral probiotic supplementation, including decreased diarrhea, inflammation, and increased sustained gut lactobacillus during the doxyrubicin regimen.

(The three groups were fed Forti-flora, another multi-strain probiotic, and a placebo).

**TICK-BORNE DISEASE:** The tick born disease portion of this conference discussed three topics:

Canine Lyme Disease - Is the clock ticking?

by Dr. Jason Stull, VMD, PhD, DACVPM

Tick species in the United States include:

Borrelia burgdorferi - found in N. America, Canada, EU, Australia, and Asia. Borrelia burgdorferi is the number one vector of disease in the US

Western Black-legged tick

Eastern Blacklegged tick- In Texas, the Eastern Black-legged tick is often responsible for spreading Lyme disease

Ixodes tick

Gulf Coast tick

American Dog tick

Lone Star tick- This is the hardest tick to kill, and is prevalent throughout the United States.

There are four stages of tick development and reproduction, and each stage requires a blood meal before moving on to the next stage. When a tick bites its host, it vomits its stomach contents into the host.

Although there has been a lot of research on Lyme disease in people, until recently, there was not much done with canines. Therefore, the reportable human disease information is helpful in understanding the

risk for dogs. Symptoms in people include the target-shaped erythema migrans, which shows up day three through thirty. Sometimes additional symptoms can appear up to months later.

In dogs, Lyme disease frequently shows no signs, and in some regions, dogs frequently test positive. Clinical signs, when they do appear, appear in approximately 5% of infected dogs, and may include lameness, fever, and arthritis. Months later, decreased appetite, and Lyme Nephritis, a severe form of protein losing nephropathy, (kidney disease) may occur, and although rare, is usually fatal.

The Idexx Snap test is used in dogs, and picks up antibodies to the disease. To see where the disease is located, look up CAPC <https://www.capcvet.org>.

To control this disease (and others), tick control is paramount. Dogs should have tick control 24/7 all year long. People should have protective clothing and a repellent with 20-30% DEET, Picardin, or permethrin. Both species should have frequent tick checks. Other tick reduction methods include keeping grass mowed, and maintaining a five foot barrier of gravel or wood chips between the woods and the lawn. Note: Dogs that are vaccinated against Lyme disease are less likely to test positive for it.

## Bartonellosis: The Dog That Changed The Course of My Research, Career, and Life

by Dr. Edward Breitschwerdt, DVM, DACVIM, \*

\*The Dr. Breitschwerdt is the Dr. Asa Mays Awardee for Excellence in Canine Health Research, and this year's Keynote speaker

Bartonella is a gram-negative bacteria with short pleomorphic rods that divide within 22-24 hours. Their cell targets include erythrocytes, endothelial cells, CD4 progenitor cells, as well as others. Dogs can test negative and still pass on the bacteria for weeks (as in Brucella).

Flea control is also important. Known vectors include: Sand fleas (Bartonella Bacilliformis), Human Body Louse (B. Quintana), Horn fly (B. Bovis), Cat flea (B. Henselee).

Three species of Bartonella can be passed on to humans, and dogs. There are thirty-eight species of Bartonella, and reservoirs include rodents, cats, dogs, bats, rabbits, and jack rabbits. Bartonella can cause endocarditis in humans (B. Quintana) and dogs (B. vinsonii/bergdorferii).

The B. vinsonii/bergdorferii, aka BVB, genotype's historical progression is : 1. polyarthritis, 2. weight loss, 3. seizures, 4. vasculitis, 5. epistaxis, 6. endocarditis. If infected, then the body develops antinuclear antibodies.

B. Henselee is passed within 24 hours, and survives for at least nine days in feces. It has a twelve day lifespan, and can even be collected off of countertops

Bartonella can trigger Lymphadenitis, Hepatitis, Rhinitis, and Encephalitis. and canine and human characteristics are similar.

Dr. Breitschwerdt stated that breeders who import dogs should be very concerned relating to Bartonella. He mentioned as an example, 25% of the dogs in Turkish shelters are infected with Bartonella. Moving dogs around the globe spreads vector disease, despite testing. Bartonella, Babesia, and Mycoplasma species infections can result in splenic cancer (hemangiosarcoma) in dogs. We now find Bartonella associated with greater vasculitis and thromboembolism. PCR culture is the best method of diagnosis.

Note: 20% of all human cancer is thought to be caused by infectious agents.

See: Microbial Methods 2007, Christine Perez C., et al, JMM, 2011

The technology that was developed by NCSU - IPRL research team is BAPGM Enrichment blood culture/PCR. They are also certified to test humans; often both humans and their dogs are BAPGM positive.

Galaxy Diagnostics, Inc., Research Triangle Park, NC

### Erlichia Canis, The Bad Habits Of

by Dr. Anne Avery, VMD, PhD

<<http://esu-cmb.s.colostate.edu/academics/mip/ci-lab>>

In the early 1970s, an emerging problem for military dogs was Canine Tropical Pancytopenia, which caused epistaxis, anemia, leukopenia, and increased susceptibility to infection. Before 1969, there were 169 fatal cases, and the organism that caused this was E. canis. Most dogs don't develop severe disease, but German Shepherd Dogs are more likely to.

E.canis infections can mimic Leukemia or Lymphoma. Note: Ross University found that more dogs with concurrent Babesia were in the group that were more ill, than were otherwise healthy dogs.

#### Tick Panel Discussion

Statistically, dogs that have been treated with tick prevention products are protected against Lymphoma. Dr. Edward Breitschwerdt stated that he uses prevention on his dogs and cats "365 days a year", and when queried as to which product, he replied "Seresto collar". He also stated that every new drug and vaccine is a two-edged sword, and that "The kindest therapy is an accurate diagnosis".

#### **Canine Cognition:**

Canine Cognition: A Neuropsychological Approach

by Dr. Bill Milgram, PhD

Dr. Milgram was involved in the initial research on Anipryl (Pfiser) to see whether this drug could improve the quality of life in old dogs; specifically, on cognition. The work led to the first FDA approval of Anipryl, and the launch of diets and natural products which were designed to improve the quality of life in dogs.

Before his research, few publications had been written on canine cognition. Since Dr. Milgram's research, from 1969 through the present, the work on cognition in dogs has been greatly expanded.

Cognition refers to mental experiences (thoughts) and cognitive level refers to mental capabilities. Dr. Milgram's research takes a neuropsychological approach; i.e., cognition consists of a set of distinct cognitive domains, and each domain is tied to distinct underlying neural structures:

Executive function

Attention

Working memory

Episodic memory

Language

Some functions show more age dependence than others (old dogs perform better in executive function than young dogs). Other factors besides age that can affect cognition are cognitive experience, and nutrition and lifestyle. Both environmental enrichment and diet combined assist in attenuating the development of age-related cognitive impairment; ie, an antioxidant rich diet is only effective when combined with intellectual enrichment. Research found that supplementation with a low-dose, medium-chain triglyceride after ninety days, increased performance in several cognitive domains.

### **Canine Epilepsy:**

Searching For Genetic Risk Factors For Canine Epilepsy in Whole Genome Sequences

by Dr. Gary Johnson, DVM, PhD

Current CHF Grant - 2257: Identification of Genetic Risk Factors for Canine Epilepsy

Dr. Johnson, in his research, studied over 2,000 epileptic dog samples that were provided to the DNA Repository. He stated that the initial funds for this research were provided by the AKC Canine Health Foundation. His goals were to identify genetic risk factors that are contributing to the development of epilepsy within individual breeds ( breeds studied based on availability of DNA from same-breed

epileptic dogs that can serve to validate risk factor candidates), and to identify genetic risk factors that are contributing to the development of epilepsy across breeds.

Epilepsy is a neurological disorder characterized by recurrent seizures, which result from interrupted neurological activity in the brain. Prevalence is up to 7.5% of dogs, and over 750, 000 dogs are diagnosed in the United States each year. Seizures come in different forms:

General seizures, in which the dogs stiffen, and lose consciousness

Focal seizures, in which the dogs remain conscious, and the seizure is limited to a small area of the brain. Signs depend on the area of the brain that is involved. (Note: focal seizures can expand into a general seizure).

Types of Epilepsy include:

Reactive Epilepsy, in which a normal brain reacts to external causes

Syndrome Epilepsy, which occurs by mutation (first identified at the University of Missouri)

Structural Epilepsy, resulting from a brain tumor, or from leukodystrophy, where the normal brain structure is deteriorated.

Idiopathic Epilepsy, (where the above three types of epilepsy have been ruled out). This is the most common form of epilepsy in both dogs and people. It is described as two or more unprovoked seizures for which there is no known cause, other than a presumed genetic pre-disposition.

Genetic Epilepsy, where genetic causes have been established. Gene "ADAM23" increases susceptibility, and is marked by a haplotype (markers on genes that are very close together and will often transfer together). Breeds where ADAM23 is marked by a haplotype include Belgians, Min Pins, Finnish Spitz, Laps, Schipperkes, Aussies and Pyrenean Shepherds. Research on ADAM23 is an ongoing work; the risk of the haplotype is common even in non-epileptic controls. To identify individual risk factors, specialists use Whole Genome Sequencing - where the genetic sequence of all chromosomes is determined; currently the cost for generating whole genome sequencing is approximately \$2000.00 (not including costs of analysis and storage).

Note: In traditional genetics, disease lead to mutations; in reverse genetics, mutations lead to disease.

\*\* Dr. Johnson stated that they are looking for blind German Shepherd dogs to study.

CHF Grant 2257, a two year grant.

Secondly, they are looking at cross-breed genetic risk factors for Canine epilepsy.

Researchers will use the Agena mass array to genotype collection of approximately 2000 specimens. Variants will be analyzed from 500 dog whole genome sequences to identify 15 to 25 of the highest risk factor candidates. Currently 300 whole gene sequences are downloaded and ready for analysis.

Drug-resistant (refractory) Epilepsy, occurs in one third of epileptic dogs, and negatively affects both the dogs and their human caregivers. Dogs with refractory epilepsy experience increased disease complications and shortened lifespan. and their caregivers experience financial burden and decreased quality of life. One third of both humans and dogs with epilepsy experience drug resistance; both have behavior complications, and experience disease progression. Causes for both species are likely to involve multi-functional genetics

## Exploring the Role of the Gut Microbiome In Epilepsy

by Karen Munana, DVM, PhD, DACVIM Neurology

Current CHF Grant - 2249-A: Studying The Role of The Gastrointestinal Tract in Canine Epilepsy

Dr. Munana starts out by stating that epilepsy is the most common nervous system disorder of dogs. Lately there has been extensive research on the relationship between the GI system and the nervous system. The epileptic canine's diet is often unconventional, and may include any of the following diets:

Grain free, Raw, Prescription, or Home cooked

A link between epilepsy and GI disease in humans is well recognized; In an IBD (irritable bowel disease) study, over 30,000 adult humans had a 1.3 increased risk for epilepsy, as compared to the control group. There has also been a link noted with Leaky Gut Disease, and it is thought that this association may have an immune basis.

Microbiome is an escalating field of research, with greater than 9000 publications. The term Microbiota means a collection of microorganisms living in a specific environment. Gut microbiota is a complex, dynamic system, that includes food, exposure to microbes, and pharmaceuticals. A balancing of good and bad bacteria determines our state of health or disease. The term "microbiota-gut-brain axis" is used to describe the intricate bidirectional signaling between the GI tract and nervous system, and emphasizes the newly recognized role of intestinal microbes in these interactions. The maintenance of this system is vital for health. Imbalances of this system are associated with IBD, neoplasms of the GI tract, rheumatoid arthritis, diabetes mellitus, cardiovascular and pulmonary disease, and neurological problems such as schizophrenia, autism, Alzheimer's disease, MS, Parkinson's disease, and others.

Alterations in Lactobacilli can play a role in nervous system diseases: anxiety and depression, MS, Alzheimer's disease, and autism. In a study where mice were fed Lactobacillus vs. control mice, the mice fed Lactobacillus behaved better in the trial, and due to decreased cortisol, were able to tolerate a stressful environment better than the controls. (This result suggested that the cortisol levels were reduced, therefore controlling blockage of the vagus nerve). The researchers also found that in ten studies, probiotic effects on depression in humans elevated mood, reduced anxiety, and improved cognitive abilities.

In other studies, one report showed how fecal microbiota transplantation cured epilepsy in a case that

involved Chrons disease. The subject, who had suffered up to 120 seizures per year, was treated with fecal transplantation, and her seizures were reduced to 2-3 seizures per year.

Again, in humans, the Ketogenic diet is an established treatment for epilepsy, and can positively alter the gut microbiome. In humans with multiple sclerosis, this diet normalized the gut microbiome in approximately six months, and the MS improved.

Epilepsy results when there is an imbalance between excitation and inhibition in the brain; Lactobacillus is capable of producing GABA, which inhibits excitation.

A recent study hypothesis is that dogs with epilepsy have an alteration in gut microbes; Lactobacillus can influence the course of the disease and researchers are looking for two dogs living the same house, with the same diet, one of which has epilepsy. Fecal samples will be analyzed. Karen\_munana@ncsu.edu.

## Epilepsy and Nutrition

by Dr. Rowena Packer, PhD, co-investigator with Dr. Holger Volk, DVM, PhD, DECVN

AKC CHF Grant - 2252: Investigating a Ketogenic Medium Chain Triglyceride (MCT) Supplement for the Treatment of Drug-Resistant Canine Idiopathic Epilepsy and It's Behavioral Comorbidities

Dr. Packer started her discussion stating that because epilepsy is a complicated, multifactorial brain disease, new, more holistic approaches to epilepsy management are needed, as well as a team effort, including breeders, owners, veterinarians and AKC. Along with other treatments, a ketogenic diet based on medium chain triglycerides (MCT) has recently been shown to improve seizure control and reduce behavioral co-morbidities in some dogs with ideopathic epilepsy, when fed as an adjunct to antiepileptic therapy.

Dr. Packer states that some of the most frequently affected breeds include Border Collies, German Shepherd Dogs, American Staffordshires, cross breeds and Labrador Retrievers. We humans can help with providing effective communication, treatment compliance, education, and expectation setting.

Overall, median prescription compliance is 56.4%; compliance at 80% is 33%, 100% compliance amounts to 22.3 %. During a non-compliant prescription cycle, a patient will miss a median of six days of treatment.

During client education, make sure the caregiver knows the importance of the antileptics, the amount of antileptic therapy, not to add supplements without talking to the Vet., and to stay on a consistent diet. Poor client-owner communication may lead to inaccuracies in estimating, treatment, and success.

In studies, three diets were fed to dogs;

The Hypo-allergenic diet

Omega 3 Fatty Acid supplementation

The Ketogenic diet- This diet increased fat, decreased carbohydrates, and proteins. A ketogenic diet based on medium chain triglycerides (MCT) was shown to improve seizure control and reduce behavioral comorbidities in some dogs with idiopathic epilepsy, when fed as an adjunct to antiepileptic drug treatment. In one study, 14% of dogs were fed the MCT diet, and 48% of dogs showed a 50% or greater reduction in seizure frequency.

## Harmonization of Genetic Testing for Dogs

by Brenda Bonnett, DVM, PhD

Current CHF Grant - 2328-A: harmonization of Genetic testing for Dogs

Dr. Bonnett discussed the current lack of mandatory standardization or accreditation for genetic testing of companion animals, and development of new tests are rapidly expanding, causing many breeders, breed clubs, veterinarians, and advisors to be overwhelmed with the challenges of integrating new, scientific developments and genetic tests into sound breeding decisions.

The International Partnership for Dogs (IPFD) Harmonization of Genetic Testing for Dogs is backed by National Kennel Clubs, the AKC Canine Health Foundation, The Orthopedic Foundation for Animals, Leadership Sponsor Commercial Test Providers, and others. This resource will aid national and International kennel clubs, breed clubs and advisors, veterinarians, and other users to make informed decisions on testing, health, and welfare of their dogs. I encourage you to visit the online platform of the IPFD at [DogWellNet.com](http://DogWellNet.com).

### **Canine Reproduction:**

#### Semen Evaluation, Quality, and the Effects of Aging

by Stuart Meyers, DVM, PhD, DACT

Current CHF Grant - 2192 - A: Advanced Semen Analysis in Labrador Retrievers

Dr. Meyers described the study with 39 Labrador Retrievers from the Guide dogs for the blind breeding program, and the dogs, aged 1 to 10 years, were divided into three groups, (Y= 1-3 yrs), (M=4-6 yrs), and (S =7-10 yrs) and evaluated for progressive and total motility, average path velocity, morphology, membrane lipid peroxidation, presence of sperm reactive oxygen species, sperm chromatin structure, and mitochondrial copy number. Progressive motility and the presence of reactive oxygen species were only lower in the senior chilled sample; velocity decreased with age and was lower in the chilled samples. No difference was found in fresh or chilled samples regardless of age. In frozen semen, progressive and total fertility was lower.

Dr Meyers stated that they are currently studying semen from dogs with sub-fertile semen. Semen from

subfertile dogs shows marked decrease in fertility with frozen/thawed semen, as well as greatly reduced motility and viability.

### An Update on Canine Brucellosis: A call for Interdisciplinary Action

By Angela Arenas, DVM, PhD, DACVP

Current CHF Grant - 2275-A Development of a Brucellosis Vaccine for Dogs

Canine brucellosis infection by *Brucella* spp. presents a serious for dog breeders, dog owners, due to the potential for major economic loss associated with reproductive loss, and is a public health concern because of its zoonotic potential (ability to spread to humans). New data points to the reemergence of canine brucellosis in the US at a fast pace.

Brucellosis is an intracellular bacteria that survives inside the cells, making it difficult to detect. It is a worldwide health concern, and has different variants:

B. abortus - Found in cattle, wildlife, elk, and Bison in the greater Yellowstone area, Mexico, and South America.

B. melania - Found in sheep and goats

B. suis - A form that is highly pathogenic in humans, and also found in dogs (both wild and domestic) and pigs. There is increasing prevalence in wild hogs in the U.S..

Typically, Brucellosis is seen as a reproductive disease, and in dogs, causes abortion at 45 to 59 days gestation. In females, there are often vaginal discharges that can last up to two months, and cause repeated conception failures. In males, it causes epididymitis, prostatitis, orchitis, and scrotal edema with dermatitis, shrunken testicles, and obliterated seminiferous tubules. Other symptoms can include disco spondylitis, lameness, spinal pain, neurological dysfunction, muscle wasting, and ocular problems/uveitis.

Testing for Brucellosis is problematic; it is very difficult to get good test results

Diagnostic tests: We do not have a good diagnostic test, but there is a serologic test that can tell you if the dog was exposed. Tests include the rapid slide agglutination (RSAT) test, or the 2-metha capteral (ME-RSAT), agar gel immunofluorescence (AGID), or immunofluorescence (ELISA). Not all Brucellosis are similar: there are good tests for *B. abortus* and *B. melitensis*, but there is not a good test for *B. ovis* or *B. canis* .

The "gold standard" is a culture, which is an old method, and may only pick up bacteria intermittently, necessitating multiple attempts. Challenges include not having a PCR commercially available, and the need for new diagnostic markers.

Treatment:

The recommended treatment is euthanasia.

Antibiotic therapy, which has a variable success rate, is sometimes tried with doxycycline, tetracycline, rifampin, or enrofloxacin.

\*Brucellosis is a biosafety level 3 pathogen; a very high risk!

The incidence of *B. canis* in the U.S. is not known, but it is estimated that this country has 77.8 million dogs. Epidemiological studies in other parts of the world have demonstrated that 28% of strays have

*B. canis* antibodies. 30% of dogs that are adopted come from shelters with no testing, and the disease is only reportable to state health agencies in eighteen states. Five states have official policies to report human or canine infection.

In Texas, 13% of the feral hogs test positive. It is important to keep people, pets and hunting dogs away from feral hogs. No vaccine is currently available.

People need to develop an understanding of this disease, isolate all kennel dogs from newcomers, practice disease surveillance in the kennel, and observe strict biosecurity. *B. canis* can live for up to two months after bleaching, disinfecting and drying.

For stud dogs in Brucellosis endemic areas, testing protocol should be:

First check that the dog has been cleared, and second, check every 4 weeks, (at least two times with 4 week intervals) for *B. suis*, there is no official commercial test, but you can use the *B. canis* test, and it should cross react.

## Canine Pyometra

by Marco Coutinho de Silva, DVM, PhD, DACT

Current CHF Grant - 2264-A: Role of E.Coli Biofilm in Canine Pyometra

Canine Pyometra is a potentially life-threatening infection of the canine uterus, and incidence of occurrence has been reported to be 9- 15.2%, with older bitches who have never or rarely had a litter being the most at risk, but it can affect younger bitches. It is a progressive disorder, and is usually associated with presentation of cystic endometrial hyperplasia. Pyometra can, rarely, occur concurrently with pregnancy. predisposing factors are prolonged exposure to P4 (diestra), and age.

Experts no longer recommend estrogen administration to prevent unwanted matings, or progesterone administration to decrease estrus.

A high P4 results in glands secreting "uterine milk", a closed cervix, and inhibited myometrium contractions. Fluid accumulates in the glands, which develop cystic endometrial hyperplasia, and the glands don't regress during late estrus. Females usually have bacteria in their uterus; the problem

occurs when there is an imbalance of bacteria.

Clinical signs include: leukocytosis, a vaginal discharge (either open or closed), anorexia, vomiting, depression, diarrhea, septic shock, and eventually, death.

Diagnosis includes, abdominal palpation, a vaginal culture and cytology with degenerated neutrophils, and bacteria, radiograph if greater than 45 days since estrus, ultrasound (the gold standard).

Treatment consists of 1.) an ovariohysterectomy, which has a high success rate, or 2.) medical treatment without a hysterectomy. This is costlier, has a slower recovery rate, and a higher chance of reoccurrence. Consider the bitch's age, value for breeding, whether or not she is systemically ill, and the stage of CEH (there is no cure).

### **Bladder Cancer in American Eskimo Dogs**

While I was attending this conference, a veterinarian who had attended a breakout session for veterinarians only called my attention to the fact that American Eskimo Dogs have the highest incidence rate of any breed for Transitional Cell Carcinoma(TCC), also known as urothelial carcinoma (UC), a type of bladder cancer that, until now had usually gone undiagnosed until late in the course of the disease. She directed me to Dr. Matthew Breen, PhD, CBiol,FRSB.

According to Dr. Breen, this cancer accounts for an estimated 1-2% of all cancer cases diagnosed in dogs, with an anticipated 80,000+ diagnosed cases this year. Ninety-five percent of cases occur in dogs 6 years and older. Diagnosis of TCC/UC has in the past been difficult, since the symptoms are vague and mimic cystitis and prostatitis; straining to urinate, urinary frequency, blood or pink-tinged urine, and bacterial infection. Treatment would be mistakenly based on the assumption of an infection, often repeatedly, and by the time a correct diagnosis is made, 90% of TCC/UC cases are intermediate to high grade invasive tumors, and 20% have spread to other sites.

Dr. Breen has developed a non-invasive, urine-based test that can detect TCC/UC up to four months before symptoms develop, allowing therapy to be initiated in the earlier stages of the disease. For more information, visit [info@sentinelbiomedical.com](mailto:info@sentinelbiomedical.com), and [www.sentinelbiomedical.com](http://www.sentinelbiomedical.com).