CANINE EPILEPTOID CRAMPING SYNDROME
IN BORDER TERRIERS

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HISTORY

In 1997, Diana Plange, a German veterinarian and Border Terrier Breeder (Malepartus) received several phone calls from anxious Border Terrier owners whose dogs Ms. Plange had bred. They were observing epileptic-like problems in their dogs. However, many of the presentations did not fit the classic form of epilepsy. So after taking a further health survey, she decided to give up on her own breeding program and started working to find the cause of this condition, which was epileptoid in character.

Ms. Plange arranged to have more than 100 Border Terriers examined thoroughly in her own surgery as well as in specialists' clinics. Many of the affected dogs showed abnormal liver function which resulted in much of the early focus implicating hepatic disorders as the cause of the newly discovered disease. However, after the number of symptomatic dogs with apparently normal livers increased, the concentration shifted to diet in early 1999, as through thorough investigation she found that the symptoms were responding to a nutritional change. It soon became clear that the condition must have a genetic (hereditary) background.

Ms. Plange wrote some articles discussing this disorder which were placed on her web site and published in different European dog magazines, as well as some veterinary magazines. As a result, there were more responses from Border Terrier owners and some veterinarians who felt their dogs were exhibiting these symptoms, not only from Germany and other parts of Europe, but from all over the world as well.

Samples of liver tissues, blood and urine were sent to several laboratories including the U.S. Thereupon, a world wide cooperation among interested scientist started, and quite a number of people were involved. It was Erica Jabroer-ter Lüün from the Netherlands who stepped in at an early stage of Mrs Plange`s investigations and in an enormeous effort not only built up what can easily be recognized as the best Border Terrier database worldwide, but, together with Mrs Plange, coordinated research at several European universities.

Ms. Plange came to the U.S. Border Terrier list in early 1999 inquiring about the BT's in America and asking if any dogs had unusual epileptic-like symptoms, because a number of suspected carriers were imported from GB to the USA. Ms. Kris Blake contacted Ms. Plange and found that the symptoms of her dog ‘Breaker’ were identical to those of the dogs in Germany and that his pedigree contained dogs who also suffered from the disorder. Then, with Kris Blake struggling with this unusual medical problem in her dog, the problem became recognized in the United States, too.

"Breaker’s" death in early 2002, at the age of seven, brought early attention to the problem in the United States. Connections were made between Ms. Blake and owners of other cramping dogs. One of these was an internet support list started by Joke Miedema of the Netherlands and Kris Blake. The purpose of this list was to provide support for owners of symptomatic dogs and to help determine what dietary changes and medications might help the affected dogs. These had all been collected from the experiences of

German owners who had acted upon the advice given to them by Mrs. Plange. It also became quite apparent by exchanging experiences on this list that dramatic remissions occurred when these dietary changes were made. Joke Miedema named the list “Spike's Disease", after her dog Spike who suffers from this disorder.

In science it is customary for the person who first described a condition to also give it a name. So in the spring of 2003 Diana Plange decided to give the condition a descriptive name: Canine Epileptoid Cramping Syndrome.

Dr. Leichty contacted another Border Terrier owner/veterinarian, Dr. Liz Whitney, who directed him to neuromuscular researcher, Dr. Diane Shelton in San Diego, California. Dr. Shelton of the Comparative Neuromuscular Laboratory at UCSD graciously donated research, which also suggested that the disease was metabolic in nature because of elevated pyruvate and lactate levels in plasma and urine on organic acid screens. These results were duplicated in urine samples sent to Phiadelphia Childrens’ Hospital by Diana Plange and Prof. Urs Giger (Switzerland).

Genetic issues also became more apparent as documented family lines were carefully recorded. Initially pedigree research was coordinated by Erica Jabroer-ter Lüün of the Netherlands and aided by Ms. Blake of the United States. It was discovered that the first identifiable Border Terrier found to be symptomatic dated back to 1974. At this time the mode of inheritance has not been ascertained. To accelerate the discovery of a gene(s), all owners of CECS dogs and those of often bred unaffected dogs are encouraged to submit blood for DNA testing to the University of Missouri’s Canine Epilepsy Network. There is no charge for submission beyond postage.

Surveys have been conducted world wide throughout the past two years in the US, Great Britain, and Germany to assess the totality of the problem of cramping/epileptic disorders. It has been discovered that between 5 and 15% of the dogs were affected with cramping/epileptic disorders. In the Netherlands, Professor Jan Rothuizen at the University of Utrecht had done research on the cramping in Border Terriers, and Ms. Jabroer-ter Lüün is currently assisting with the collection of DNA at the University of Ultrecht.

Mark Leichty DVM, in the United States, has been coordinating the efforts for testing, and assisting owners and veterinarians. Kris Blake is collecting video and written documentation concerning affected dogs in the United States, creating extensive research pedigree's that will aide in determining the inheritance mode of CECS, and moderating a Yahoo CECS discussion group that is international. A web site dedicated to this disease may be found at: **http://www.borderterrier-cecs.com** There is a special group that has been created for asking questions and sharing your experiences with your Border Terrier and CECS or just learning more about this disease. For more information on how to join this group, just visit the group's website at: **http://groups.yahoo.com/group/CECS-SD/** To subscribe to this group, you can go to that site and click "join" to join this group or send a blank e-mail to: **CECS-SD-subscribe@yahoogroups.com**

SYMPTOMS/CLINICAL PRESENTATIONS

CECS is often confused with epileptic seizures and can occur in a wide variety of ways. It can happen as mild and very infrequent episodes (occurring once or twice in a dog's life) of staggering, ataxia, and trembling. More frequent episodes may also involve exaggerated stretching and lip licking, and more severe occurrences exhibit cramping and extension of varying limb and torso muscles and even falling and recumbency. Some dogs display rippling contractions of abdominal and/or lumbar muscles. A number of cases involve intestinal problems manifested as borborygmus (loud abdominal noises). The dogs remain cognizant and responsive throughout the incident.

Duration of episodes typically varies from seconds to half an hour. In some cases the disease is progressive and worsens. Onset of the syndrome usually ranges from two to six years but has occurred in dogs as young as four months and as old as twelve years.

The episodes often follow ingestion of offending food items, an abrupt increase in exercise, temperature extremes experienced in winter and summer, and re-homing. The possible link to stress leads this author to theorize that corticosteroids may exacerbate and worsen the condition. Recently some cases have displayed (mild) cramping episodes immediately following an intensely stimulating incident.

In addition to epilepsy, CECS is also often confused as back/spinal problems and irritable bowel disease.

Pet Owner Descriptions

EXAMPLE ONE

When he was about 4 months old eating breakfast, he got stiff and stretched-out looking. He stopped eating, was trembling, then fell to one side and struggled to get up for several seconds. He had a small B.M., and then seemed to shake it. During this episode he was conscious and seemed to be fighting what was happening.

Since then (he's now 6 mos.), he's had a few episodes, most recently two in the last week after the morning kibble and then coming to the back door, he's gotten stiff, especially in his back legs, and would do a slow stiff walk. His head will bend back to one side at a funny angle and he'll look at me and lick his lips and he will cock his tail at a funny angle. His back will slightly arch. At first I thought he was being obstinate, so I'd call him more firmly, but I realized he heard me but was stuck. Sometimes he'd stagger out to the stairs and wait for the stiffness to pass. Then he'd stretch and shake, about 30 seconds or a minute later, and be fine.

EXAMPLE TWO

He is now four years old and the first symptoms came very early, but in the beginning it was just a slight staggering in his back legs. We didn't think so much of it then. But later on he has had some real cramps with really tense muscles in all his body and he is shaking and can't use the hind legs at all. It lasts about five minutes and then he seems to recover entirely rather fast. All the time he is fully aware and you can talk to him. We have witnessed about 5 such seizures over the last 3 years.

He has had trouble with his stomach; it's been hard to find a food that suits him. Now we give him a food based on lamb and rice, with 19% protein. It seems to be ok. Sometimes his stomach gets very noisy and painful. He then gets tense and is obviously in great pain. BUT on those occasions I wouldn't say that he is cramping in an epileptoid way. I think that it is the pain that makes him tense and shivering. And he has never had a cramping seizure at the same time.

On a couple of occasions when it has been really cold outside we have had to carry him home, so it seems obvious that cold can trigger a cramping episode. Last Christmas he got a treat that smelled like a pig’s ear and the day after he cramped.

TREATMENTS

Diazepam and Clorazepate Dipotassium have been used successfully in some cases to alleviate cramping in the short term. They have also failed to help in a few other instances. In Europe (Buscopan) scopolamine rectal suppositories have helped to alleviate intestinal forms. There is a similar injectable medication in the US labeled for equine use called Buscopan.™ Recently there has been reported success using Gaviscon.

Most dogs become asymptomatic with dietary changes.

Dietary changes should only be made on the advice of the attending veterinarian. These changes are suggested if a dog has had a pattern of cramping episodes and all diagnostic testing has been completed.

These changes are recommended based on the current theory that CECS is related to some specific (and unknown) dietary protein(s) and/or other entity.

COMMERCIAL DIETS THAT SEEM TO WORK

Hill's K/D

Eukanuba Lamb and Rice

Hill's Z/D or Z/D Ultra

Royal Canin Hypoallergenic DR-21

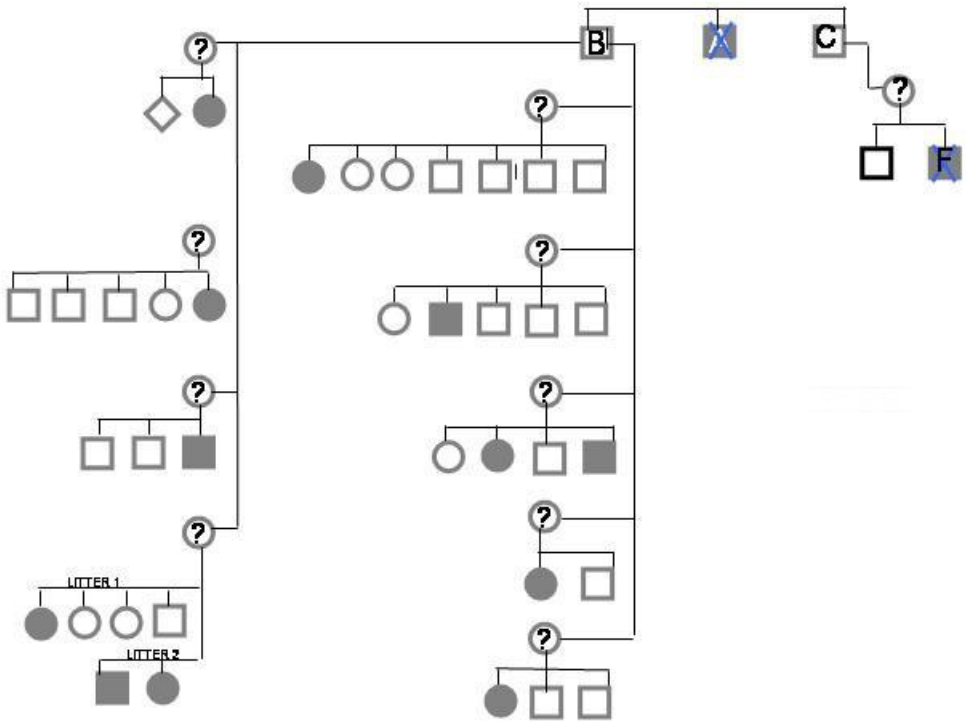
Hill's D/D Duck and Rice, Salmon and Rice, or Egg and Rice

Eukanuba Early and Late Stage Kidney Food

COMMON OFFENDERS TO AVOID

Beef Rawhide and other Chews (i.e. Bully Sticks)
Pigs Ears
High Protein treats
Garbage and Feces
Bird Seed
Tin-food like Chappy

GENETICS



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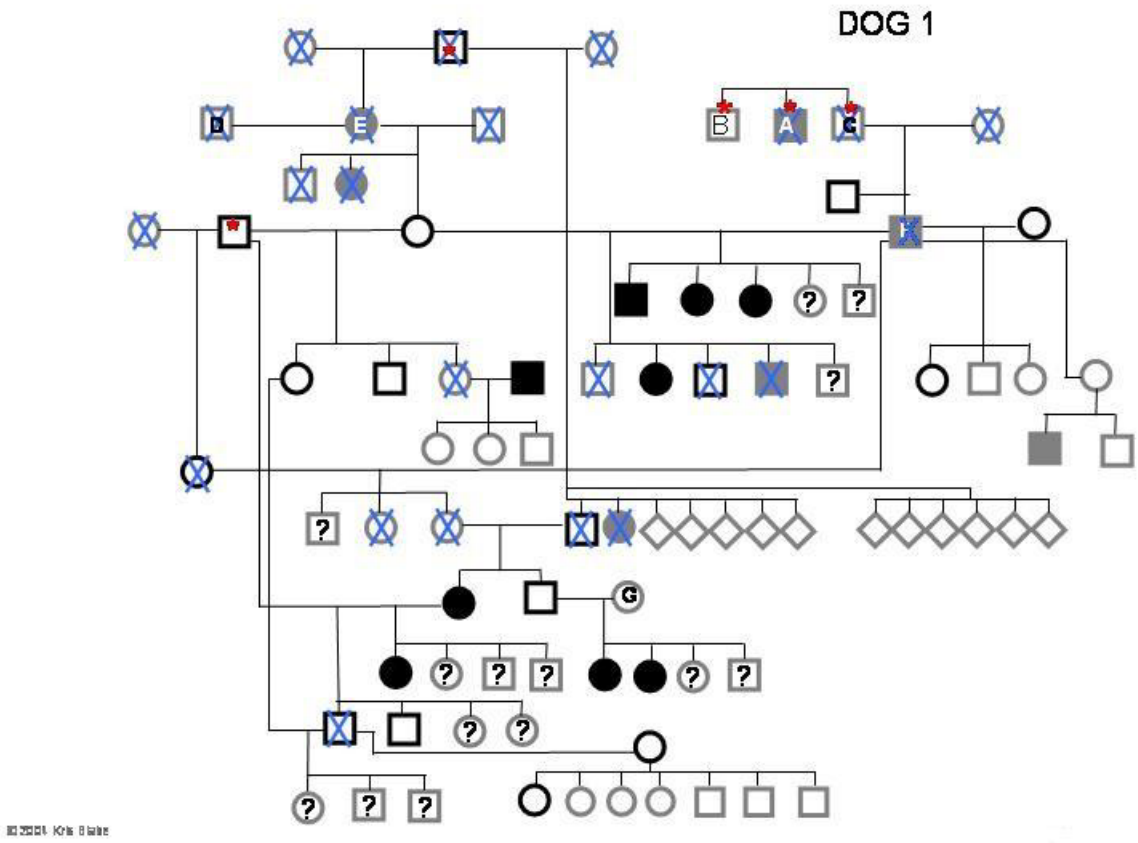
Total offspring of this male 156. No known status on remaining 119 offspring

Boxes = Male
Circles = Female
Diamonds = Unknown Sex
Shaded Shapes = Crampers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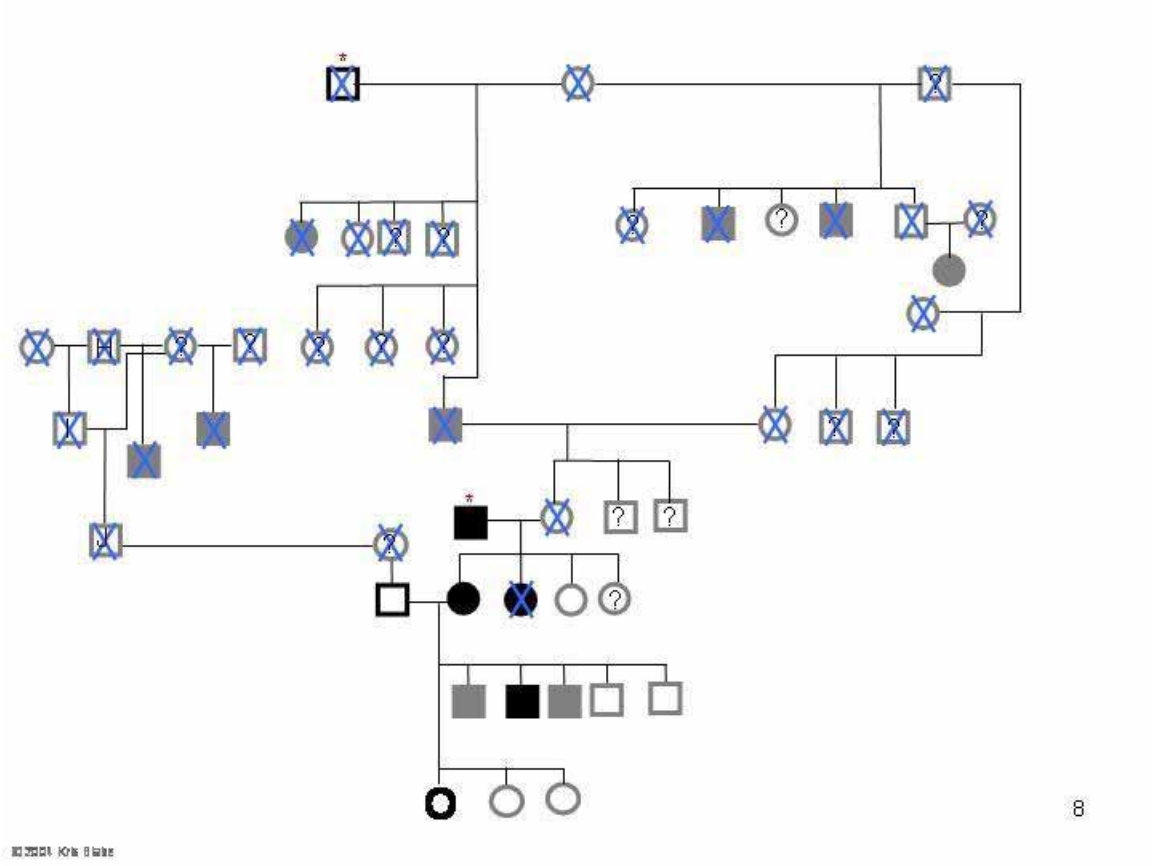

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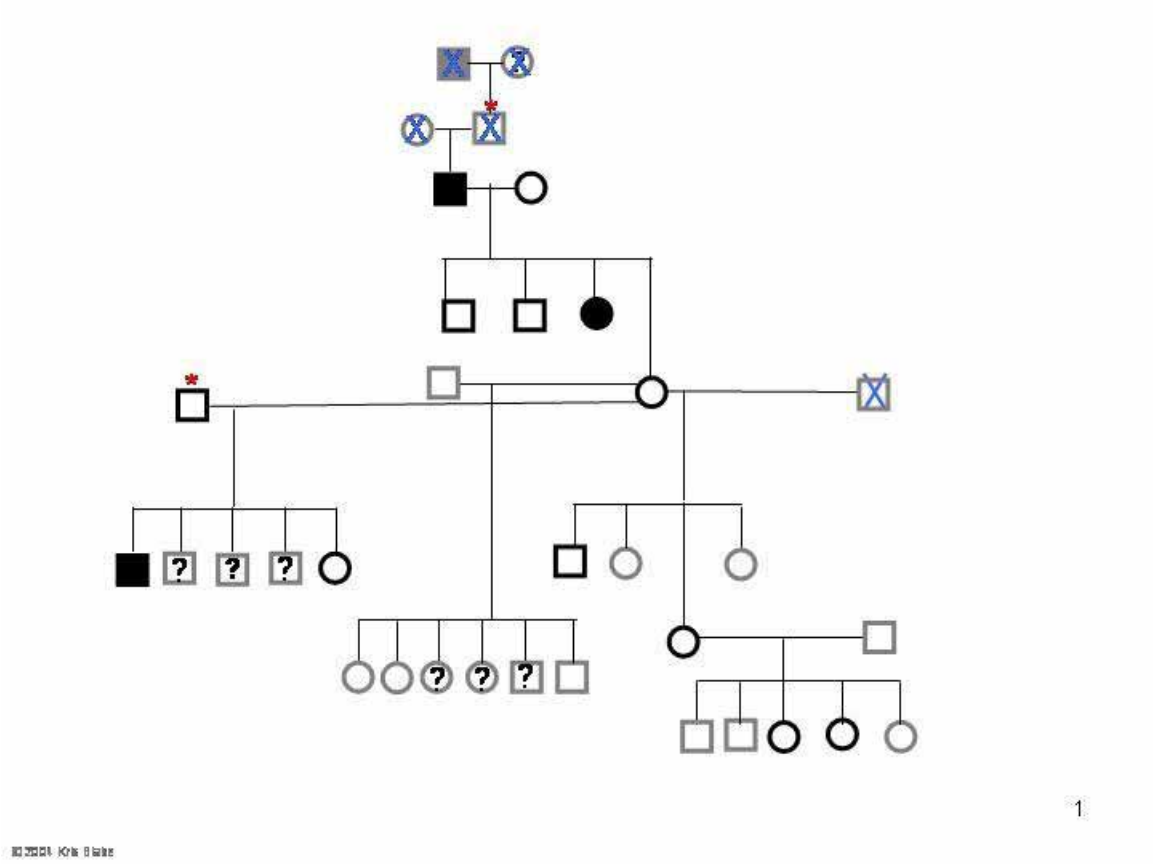

At this point the Border Terrier breed needs to find a genetic marker for this condition, and this will be accomplished when a sufficient number of DNA samples from affected and unaffected dogs are submitted. To further this endeavor, the Dr. Gary Johnson at the University of Missouri is graciously storing DNA samples submitted at no charge. For information contact Liz Hansen at 573-884-3712, HansenL@missouri.edu , or 320 Connaway Hall, University of Missouri, Columbia, MO 65211. http://www.canine-epilepsy.net/

A human geneticist who has looked at some of the pedigrees theorizes that this is an autosomal recessive problem. Thus a dog with genotype EE would be a normal dog not carrying the epileptoid gene. An Ee dog would not be a cramper but would carry the epileptoid gene, and an ee dog would be a cramper. Mating two Ee dogs would produce 25% offspring unaffected and not carrying the epileptoid gene and 50% unaffected but carrying the gene, and finally 25% affected offspring. Mating an EE dog to an ee would result in all normal offspring carrying the cramping gene.

PARENT	sire		dam		sire		dam		sire		dam
	EE	X	ee		EE	X	Ee		Ee	X	Ee
	normal		CECS		normal		normal carrier		Both normal carriers		
PUPPIES	Ee				EE and Ee				EE Ee ee		
	All normal carriers				All normal Ee carrier				N Carr CECS		