Risk factors for development of status epilepticus in dogs with idiopathic epilepsy and effects of status epilepticus on outcome and survival time: 32 cases (1990–1996)

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Objective—To identify risk factors for episodes of status epilepticus (SE) in dogs with idiopathic epilepsy and determine how SE affects long-term outcome and survival time.

Design—Retrospective study.

Animals—32 dogs with idiopathic epilepsy.

Procedure—Information on signalment, seizure onset, initiation of treatment, anticonvulsants administered, number of episodes of SE, overall seizure control, and long-term outcome was obtained from medical records and through telephone interviews. Differences between dogs that did and did not have episodes of SE were evaluated statistically.

Results—19 (59%) dogs had 1 or more episodes of SE. Body weight was the only variable significantly different between dogs that did and did not have episodes of SE. Thirteen dogs (9 that did not have episodes of SE and 4 that did) were still alive at the time of the study and were ≥ 10 years old. Six of the 19 (32%) dogs that had episodes of SE died of causes directly attributed to the seizure disorder. Mean life spans of dogs that did and did not have episodes of SE were 8.3 and 11.3 years, respectively. Survival time was significantly different between groups.

Conclusions and Clinical Relevance—Results suggest that a substantial percentage of dogs with idiopathic epilepsy will have episodes of SE. Dogs with greater body weights were more likely to have episodes of SE, and early appropriate seizure treatment did not appear to decrease the risk that dogs would have episodes. Most dogs with idiopathic epilepsy had an expected life span, but survival time was shorter for dogs that had episodes of SE. (J Am Vet Med Assoc 2001;219:618–623)

Seizures are an important medical problem in dogs and have been reported to account for 2 to 3% of admissions to referral veterinary hospitals.1,2 Idiopathic or primary epilepsy, defined as recurring seizures for which an underlying cause is not identified, has been diagnosed in almost half of all dogs with seizure disorders.1,2 However, despite this high prevalence of idiopathic epilepsy in dogs, few published reports document the course of the disease during the lifetimes of affected dogs.

A certain percentage of dogs with idiopathic epilepsy will have 1 or more episodes of status epilepticus (SE). Status epilepticus refers to repeated seizure activity without an intermission; the term has been more specifically defined to denote either continuous seizure activity lasting at least 5 minutes or 2 or more seizures with incomplete recovery between seizures.3 Untreated seizure activity can lead to irreversible neuronal injury in addition to such complications as hyperthermia, hypoxia, acidosis, hypotension, renal failure, disseminated intravascular coagulation, and cardiopulmonary failure and, as such, is considered a medical emergency.4–5 It is not known why certain individuals with seizure disorders develop SE; however, pathophysiologic studies suggest that recurrent uncontrolled seizures on their own can predispose individuals to future episodes of SE and poor long-term seizure control.6

Relatively little is known about SE in dogs. A recent retrospective study7 reported signalment, clinical findings, treatment, and outcome for dogs admitted to a referral hospital because of SE or cluster seizures, but long-term follow-up information was not provided, and little information is available on dogs with idiopathic epilepsy that have episodes of SE during the course of their disease. The purpose of the study reported here, therefore, was to identify risk factors for episodes of SE in dogs with idiopathic epilepsy and determine how SE effects long-term outcome and survival time.

Criteria for Selection of Cases

Medical records of dogs referred to the North Carolina State University Veterinary Teaching Hospital between 1990 and 1996 in which idiopathic epilepsy was diagnosed were reviewed. Dogs were included in the study only if they had been born before 1990 (to ensure that dogs would be at least 10 years old if still alive at the time of the study), were < 6 years old at the time of the onset of seizures, and did not have any evidence of neurologic disease other than seizures at any time during their lives. In addition, owners of dogs included in the study had to be available to provide follow-up information.

Procedures

The following information was collected from the medical records: breed, sex, body weight, age at the onset of seizures, and diagnostic tests used to arrive at the diagnosis of idiopathic epilepsy. Body weight recorded was weight at the time of diagnosis of idio-
pathic epilepsy, except that for dogs in which idiopathic epilepsy was diagnosed at < 1 year of age, body weight recorded was weight obtained at the time of full maturity (at least 1.5 years of age). Owners were interviewed by telephone to obtain information on the number of seizures before anticonvulsant treatment was initiated, the time between the onset of seizures and the initiation of anticonvulsant treatment, the names of all antiepileptic drugs administered and the response to treatment, the appearance of the seizures (to aid in seizure classification), whether the dog had ever had an episode of SE and, if so, how many episodes the dog had had, the dog’s outcome, and whether the dog was alive or dead at the time of the study. Referring veterinarians were contacted for additional information if owners were unable to answer any of the questions. For purposes of this study, SE was defined as continuous seizure activity lasting at least 5 minutes or 2 or more seizures with incomplete recovery between seizures.

Response to administration of each antiepileptic drug was classified as good or poor. A good response was defined as a ≥ 50% reduction in the number of seizures, compared with the baseline number, or a decrease in the frequency of seizures to < 1/mo for at least 1 year. Dogs that did not achieve this level of seizure control were considered to have a poor response to that anticonvulsant. Owners were asked to classify their dogs as seizure free or as having well controlled or poorly controlled epilepsy. Dogs were considered to be seizure free if they had had no seizures for at least 1 year prior to the time of telephone contact or for at least 1 year prior to their death. Dogs were considered to have well controlled epilepsy if they had < 50% of the number of seizures they had had before any treatment was initiated or if they had fewer than 1 seizure/mo and this pattern had been maintained for at least two-thirds of the time since the diagnosis of idiopathic epilepsy had been made. All other dogs were considered to have poorly controlled epilepsy. Owners of dogs that had died prior to the time of the telephone interview were asked whether the cause of death was related to the seizure disorder (ie, death during or secondary to a seizure episode or euthanasia because of poor seizure control). Finally, dogs were classified as having a negative outcome.

Dogs with poorly controlled epilepsy or that had died of causes related to the seizure disorder were classified as having a negative outcome. All other dogs were classified as having a positive outcome.

Statistical analyses—All statistical analyses were performed with commercially available software.3 Dogs were grouped according to whether they had or had not had any episodes of SE, and simple logistic regression analysis was used to assess whether continuous variables were associated with development of SE. Variables examined included age at the onset of seizures, body weight, number of seizures before anticonvulsant treatment was initiated, and time from onset of seizures until initiation of treatment. χ² Analysis was used to test for differences between groups with respect to categorical variables, including breed, sex, whether dogs were sexually intact or neutered, overall response to antiepileptic drugs, and percentage of dogs that died of causes related to the seizure disorder. If any of the expected cell values were < 5, the Fisher exact test was used. Kaplan-Meier survival limit estimates were generated for the 2 groups to determine whether development of SE was associated with survival time. The Wilcoxon test was used to compare survival times between groups. For all analyses, values of P ≤ 0.05 were considered significant.

Results

Thirty-two dogs met the criteria for inclusion in the study. Mean age at the time of diagnosis of idiopathic epilepsy was 3 years (range, 3 months to 5 years). Nineteen dogs were male (8 castrated), and 13 were female (11 spayed). Body weight ranged from 2.8 to 52 kg (6.2 to 114.4 lb); mean body weight was 24.2 kg (53.2 lb). There were 10 dogs of mixed breeding, 5 Labrador Retrievers, 3 Toy Poodles, 2 Golden Retrievers, 2 German Shepherd Dogs, 2 Miniature Schnauzers, and 1 each of the following breeds: Basset Hound, Standard Poodle, Vizsla, Irish Setter, Weimaraner, Shetland Sheepdog, Japanese Spaniel, and Cocker Spaniel. Labrador Retrievers comprised 16% of the study population but only 8% of all dogs examined at the North Carolina State University Veterinary Teaching Hospital during the same period; these percentages were significantly different.

At the time of the initial diagnosis of idiopathic epilepsy, results of physical and neurologic examinations were normal in all dogs. For all dogs, the minimum diagnostic testing included a CBC and serum biochemical analyses. Additional diagnostic testing included brain imaging (computed tomography or magnetic resonance imaging; n = 11), analysis of CSF (15), and a bile acids tolerance or bromsulphalein retention test (14). No abnormalities that could account for the seizures were identified with any of these diagnostic tests.

Nineteen of the 32 (59%) dogs had 1 or more episodes of SE. Two dogs had a single episode, 4 had 2 to 3 episodes, 2 had 6 to 10 episodes, and 11 had > 10 episodes. Four of the 5 Labrador Retrievers in the study had at least 1 episode of SE. In comparison, only 15 of the 27 (56%) dogs of other breeds had an episode of SE. Ten of 19 (53%) males and 9 of 13 (69%) females had an episode of SE. Both sexually intact females and 7 of 11 sexually intact males had an episode of SE, whereas 3 of 8 neutered males and 7 of 11 neutered females did. Mean body weight of dogs that had an episode of SE was 28.9 kg (63.6 lb), compared with a mean body weight of 17.4 kg (38.3 lb) for dogs that did not have any episodes of SE. Mean age of the onset of seizures was 2.3 years for dogs that had an episode of SE and 2.4 years for dogs that did not.

For dogs that had an episode of SE, mean number of seizures before anticonvulsant treatment was initiated was 3.7 (range, 1 to 10); for dogs that did not have any episodes of SE, mean number of seizures before anticonvulsant treatment was initiated was 9 (range, 2 to 30). Mean time between onset of seizures and initiation of anticonvulsant treatment was 145 days for dogs that had an episode of SE (range, 0 to 730 days).
and 448 days for dogs that did not (range, 30 to 1,095 days). One dog had an episode of SE at the onset of seizures, and 2 other dogs had an episode of SE prior to initiation of long-term anticonvulsant treatment. The remaining dogs had episodes of SE later in the course of their disease.

In each dog, the characteristics of the seizures were relatively constant over time. Thirty (94%) dogs had generalized seizures; 18 of these dogs had an episode of SE. Of the dogs with generalized seizures, 21 were reported to have an associated loss of consciousness. Twenty-six of the 30 dogs with generalized seizures had tonic-clonic seizures, 3 had tonic seizures, and 1 had clonic seizures. Two dogs had atonic seizures; 1 of the dogs reported to have atonic seizures was also reported to have generalized seizures and episodes of SE.

Phenobarbital was the first anticonvulsant medication in all but 1 dog; the remaining dog was initially treated with primidone. Seventeen dogs, including 9 dogs that had an episode of SE and 8 dogs that did not, were treated with phenobarbital alone throughout the study. Of the remaining 13 dogs, 4 were changed to a second anticonvulsant medication because of adverse effects of the initial medication, and 11 had a second medication added to the anticonvulsant regimen because of poor seizure control. Potassium bromide was chosen as the second anticonvulsant medication in 11 dogs, clorazepate in 2 dogs, and phenobarbital and primidone in 1 dog each. In 3 dogs, a third anticonvulsant medication was administered. This included 2 dogs in which the medication was changed because of development of hepatic insufficiency and 1 dog in which a third medication was added to the treatment regimen in an attempt to achieve better seizure control. The drug chosen for all 3 dogs was potassium bromide.

Overall, 28 (88%) dogs had a good response to the anticonvulsant medications administered most recently. This included 7 dogs classified as seizure free and 21 dogs in which epilepsy was considered to be well controlled. Five of the dogs classified as seizure free were receiving a single anticonvulsant medication (3 on phenobarbital and 2 on potassium bromide), and 2 were receiving phenobarbital and potassium bromide in combination. Two of these dogs had had at least 1 episode of SE. Fifteen of the dogs in which epilepsy was well controlled were receiving a single anticonvulsant medication (13 receiving phenobarbital and 2 receiving potassium bromide), and 6 were receiving multiple medications (5 receiving phenobarbital and potassium bromide and 1 receiving phenobarbital, clorazepate, and potassium bromide). Thirteen of these dogs had had at least 1 episode of SE. The 4 dogs in which epilepsy was poorly controlled had all had episodes of SE. One of these dogs was receiving phenobarbital alone, 2 were receiving phenobarbital and potassium bromide, and 1 was receiving phenobarbital and clorazepate. Of the 19 dogs that had had an episode of SE, 4 (21%) were considered to have poorly controlled epilepsy. In contrast, all 13 dogs that did not have any episodes of SE were classified as seizure free or as having well controlled epilepsy.

Thirteen dogs were alive at the time of this study; mean age was 11.8 years (range, 10 to 15 years). Nine of these dogs had had an episode of SE, and at the time of the study, these dogs were 10 (2 dogs), 11 (2 dogs), 12 (4 dogs), and 14 (1 dog) years old. The remaining 4 dogs that were still alive at the time of the study had not had any episodes of SE, and at the time of the study, these dogs were 11 (2 dogs), 12 (1 dog), and 15 (1 dog) years old. Nineteen dogs had died prior to the time of this study; age at the time of death ranged from 4 to 14 years. Ten of these dogs had had an episode of SE, and dogs were 4 (1 dog), 6 (3 dogs), 8 (1 dog), 10 (2 dogs), 11 (2 dogs), and 13 (1 dog) years old at the time of death. Mean life span for these dogs was 8.3 years. Nine of the dogs that had died prior to this study had not had any episodes of SE, and dogs were 10 (4 dogs), 11 (1 dogs), 12 (2 dogs), 13 (1 dog), and 14 (1 dog) years old at the time of death. Mean life span for these dogs was 11.3 years.

In 6 dogs, death was directly attributed to the seizure disorder. All of these dogs had had episodes of SE. Four of these dogs were considered to have poorly controlled epilepsy; the remaining 2 were considered to have well controlled epilepsy until shortly prior to their death, at which time seizures increased in frequency and became refractory to medical treatment. These latter 2 dogs were 8 and 11 years old at the time of death. Five dogs in which death was directly attributed to the seizure disorder died within 3 to 6 years after the onset of seizures. The dog with the shortest life span after the onset of seizures was the 1 in which seizures had started as SE; this dog was euthanized because of poorly controlled seizures 3 years after the initial episode of SE. The remaining dog died 9 years after the onset of seizures.

In 1 additional dog, death was indirectly attributed to the seizure disorder. This dog had not had any episodes of SE and was euthanized because of hepatic cirrhosis at 10 years of age. The dog had been treated with primidone for 5 years when treatment was changed to phenobarbital; the dog developed signs of hepatic disease 2 years later. Death was, therefore, considered to be indirectly associated with the seizure disorder, although this could not be proven definitively.

The 7 dogs in which death was directly or indi-
rectly related to the seizure disorder were considered to have a negative outcome. The remaining 25 dogs were considered to have a positive outcome. The long-term mortality rate for dogs that had an episode of SE was 32% (6/19). Two variables were found to be significantly different between dogs that did and did not have episodes of SE. Body weight was significantly (P = 0.04) higher in dogs that had an episode of SE than in dogs that did not, and time from the onset of the first seizure to the initiation of anticonvulsant treatment was significantly (P = 0.036) longer in dogs that did not have any episodes of SE. Mean survival time was significantly (Wilcoxon test; P = 0.043) longer for dogs that did not have any episodes of SE than for dogs that did (Fig 1).

Discussion

The International League Against Epilepsy has defined SE as “a seizure that persists for a sufficient length of time or is repeated frequently enough that recovery between attacks does not occur.” This definition fails to specify the length of time that seizures must persist to be classified as SE, and a time frame of 20 to 30 minutes, which is an estimate of the amount of time during which neuronal injury develops, has been used most frequently.35 However, normal brain homeostasis has been demonstrated to break down within 1 to 2 minutes after the onset of seizure activity, and discrete seizures rarely last more than a few minutes.36,37 Furthermore, most practitioners recommend medical intervention to control seizure activity well before 20 to 30 minutes have elapsed. Consequently, for purposes of the present study, we defined SE as continuous seizure activity lasting at least 5 minutes or 2 or more seizures with incomplete recovery between seizures. This definition has been used previously in studies involving human and veterinary patients.

Dogs were included in the present study only if a diagnosis of idiopathic epilepsy had been made. However, brain imaging and CSF analysis to confirm this diagnosis were not performed on all dogs, and it is, therefore, possible that some dogs had an undiscovered underlying cause for their seizure disorders. However, to be included in the study, dogs must also have had seizures for at least 4 years at the time follow-up information was obtained, and none of these dogs developed other signs of neurologic dysfunction during this time. Although it is possible that some dogs in this study may have had epilepsy secondary to a nonprogressive disorder, such as a congenital structural abnormality of the brain, it seems unlikely that any of these dogs truly had an underlying disease that was responsible for their seizures. Furthermore, the study population is representative of the population of epileptic dogs as a whole, in that the diagnosis of idiopathic epilepsy is often made on the basis of symptom, age at the onset of seizures, and results of minimal diagnostic testing that excludes extracranial causes of seizures.

Nineteen of the 32 (59%) dogs in the present study had at least 1 episode of SE. Furthermore, only 2 of these 19 dogs had an isolated episode of SE, and 11 had > 10 episodes of SE. Thus, it appears that dogs that have a single episode of SE are prone to have additional episodes in the future. The reason why some dogs with idiopathic epilepsy develop SE has not been determined. It has been estimated that approximately 10% of human patients with epilepsy have at least 1 episode of SE during their lifetimes,12 and cessation of antiepileptic treatment or low serum concentrations of antiepileptic drugs are the most commonly reported causes of SE in these patients.13,14 In contrast, these factors do not appear to play an important role in dogs. A recent study7 reported that 58% of dogs admitted to a referral hospital for evaluation of SE were receiving anticonvulsant medications at maintenance dosages at the time of examination and that SE was precipitated by low serum drug concentrations in only 5.7% of the dogs. For all dogs in the present study, serum concentrations of antiepileptic drugs were measured at 6- to 12-month intervals, and none of the owners reported a change in compliance with drug administration prior to development of SE. Thus, although it is important to periodically measure serum concentrations of antiepileptic drugs in dogs, ensure that concentrations are within therapeutic ranges, and avoid abruptly discontinuing drug administration, these things alone will not prevent development of SE in dogs.

Labrador Retrievers were over-represented in the present study, and 2 previous studies15 have also indicated that Labrador Retrievers have a greater risk of developing idiopathic epilepsy. Epilepsy has also been demonstrated to be inherited as a multifocal autosomal recessive trait in this breed.16 Interestingly, our study also revealed a propensity for episodes of SE among Labrador Retrievers, with 4 of 5 (80%) Labrador Retrievers having had an episode of SE, compared with 15 of 27 (56%) dogs of other breeds. However, despite these episodes of SE, none of the Labrador Retrievers in this study had a negative outcome. Long-term studies9,10 of human patients with epilepsy have provided conflicting results regarding whether heritable disease is associated with a worse prognosis.

Studies of human patients with epilepsy indicate that patients who have a greater number of seizures prior to initiation of treatment are more likely to have refractory epilepsy. This has been attributed to a kindling process, in which 1 seizure leads to intensification of subsequent seizures.19,20 In the present study, however, a kindling effect was not detected, in that the number and duration of seizures before anticonvulsant treatment was initiated was not significantly different between dogs that did and did not have episodes of SE or between dogs with positive versus negative outcomes. In contrast, the duration of seizures before anticonvulsant treatment was initiated was significantly longer for dogs that did not have any episodes of SE. This may reflect a difference in severity of seizures between groups; seizures in dogs that did not have any episodes of SE may have been less severe overall than in those dogs that did have an episode of SE, which in turn could have influenced the decision on when to begin anticonvulsant treatment. However, it was not possible to accurately collect data on severity of seizures in these dogs prior to initiation of anticonvulsant treatment.

JAVMA, Vol 219, No. 5, September 1, 2001

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Approximately 10% of human patients with epilepsy are first examined because of an episode of SE, and these patients tend to have poorly controlled epilepsy.\textsuperscript{10,21,22} In the present study, only 1 dog had SE during its first episode of seizures. This dog was euthanatized 3 years after the onset of seizures because of poor control of the seizures and had the shortest survival time of the dogs in the study. However, although it is possible that, as in humans, dogs that have episodes of SE at the onset of seizures may have a worse prognosis, definitive conclusions cannot be made on the basis of results for this 1 dog.

The characteristics of seizures in the dogs in this study were relatively consistent during the course of their disease. Generalized tonic-clonic seizures have been reported most commonly for dogs with idiopathic epilepsy\textsuperscript{4,11} and were observed in 26 of the 32 (81%) dogs in the present study. Although loss of consciousness is frequently associated with generalized seizures, 9 dogs reportedly did not lose consciousness during seizures. Similar findings have been reported in previous studies.\textsuperscript{11,27} Including a study in which video-analysis of seizure episodes demonstrated that 16 to 40% of dogs did not lose consciousness.

Phenobarbital is frequently used as the first-line anticonvulsant medication in dogs with epilepsy and has been reported to successfully control seizures in 60 to 80% of dogs with idiopathic epilepsy.\textsuperscript{27,28} Treatment with phenobarbital resulted in long-term control of seizures in 17 (53%) dogs in the present study. This percentage may have been lower than previously published values because of the long follow-up times for dogs in the present study. Dogs reportedly develop a tolerance to phenobarbital over time, and the percentage of dogs in which phenobarbital alone would control their seizures would be expected to decrease as the follow-up period is extended. Few adverse effects were seen in association with long-term phenobarbital administration. One dog developed hepatic dysfunction 2 years after phenobarbital administration was initiated. However, this dog had been treated with primidone for 3 years prior to treatment with phenobarbital, and it was not determined whether the hepatopathy was drug induced. In addition, the risk of hepatopathy is higher with primidone than with phenobarbital.\textsuperscript{27} The anticonvulsant regimen in an additional 3 dogs was changed from phenobarbital to a different anticonvulsant medication because of concerns about adverse hepatic effects. Two of these dogs had died at the time of follow up, and neither of the deaths was attributed to hepatic disease. The third dog was still alive with no evidence of hepatic dysfunction.

Potassium bromide is widely used as an anticonvulsant medication in veterinary medicine. It initially was recommended for use as a second-line treatment in conjunction with phenobarbital but is becoming more popular for use as a single agent, especially in dogs in which phenobarbital is contraindicated. In previous studies,\textsuperscript{27,28} the success rate of combination therapy with potassium bromide and phenobarbital was 80 to 90%. In the present study, 7 of 9 dogs in which epilepsy was poorly controlled with phenobarbital alone had improved seizure control when potassium bromide was administered alone or in combination with phenobarbital.

Long-term studies\textsuperscript{29,30} of human patients with epilepsy have suggested that the risk of death among patients with epilepsy is either not different or only slightly increased, compared with the risk for the general population. However, these studies did not evaluate the effect of SE on mortality rate. Mean life span of dogs in the present study was 11.8 years, which was slightly longer than the mean life span for dogs of 10.1 years that has been reported previously.\textsuperscript{11} Therefore, results of the present study suggest that idiopathic epilepsy alone did not shorten the life span of affected dogs. In addition, although mean life span was not significantly different between dogs that had had an episode of SE and those that had not, a significant difference in survival times was detected between the 2 groups. All 6 dogs that died of causes directly related to their seizure disorder had had an episode of SE, and these dogs died relatively early in the course of the disease. If a dog that had an episode of SE lived with its disease for > 6 years, it was as likely to attain an average life span as was a dog that did not have any episodes of SE, with death attributed to an unrelated disease. Nonetheless, results of this study suggest that in dogs that have episodes of SE, epilepsy may be more difficult to control, and such dogs are more likely to have a negative outcome than are dogs that have isolated seizures.

Seven (22%) dogs in the present study were classified as being seizure free, and a previous study\textsuperscript{4} reported that between 5 and 40% of dogs with idiopathic epilepsy can be seizure free. In comparison, between 70 and 90% of human patients with epilepsy can be seizure free.\textsuperscript{30,32} This difference most likely reflects the greater availability of anticonvulsant drugs in human medicine, along with the more intensive treatment and follow up of human patients.

In the present study, 6 (19%) dogs died of causes directly related to their seizure disorder and 6 had had episodes of SE. This percentage is lower than that reported by Raw and Gaskell,\textsuperscript{11} who studied long-term outcome of 78 dogs with idiopathic epilepsy and found that 31 (40%) died of causes related to their seizure disorder. However, 10 of these dogs died within 4 months after the diagnosis of epilepsy, and diagnostic testing to exclude underlying causes for the seizure disorders was not performed. Consequently, it is possible that some of the dogs in that study had structural brain diseases, and the mortality rate for dogs with structural brain diseases would be expected to be higher than that for dogs with idiopathic epilepsy.

Bateman and Parent\textsuperscript{4} have previously reported on the short-term outcome of dogs brought to a veterinary referral center for treatment of SE or cluster seizures. In their study, 50% of the dogs were euthanatized or died of causes related to their seizure disorder. However, it is difficult to compare these results to the findings of the present study because of marked differences in the 2 study populations. The study by Bateman and Parent\textsuperscript{4} included dogs with seizures of all causes, and only 27% of the dogs had idiopathic epilepsy. In contrast, all dogs in the present study were presumed to have idiopathic epilepsy. Furthermore, all dogs in the study by Bateman and Parent\textsuperscript{4} had been...
hospitalized for treatment of SE or cluster seizures, which likely selected for dogs with more severe seizures. In contrast, although 39% of dogs in the present study were reported to have had episodes of SE, this incidence was determined on the basis of telephone follow-up rather than hospital admissions. Episodes of SE in dogs in the present study were not often managed by a veterinary referral center, and owners of these dogs may not have sought veterinary care at all. The present study attempted to identify risk factors associated with episodes of SE and outcome of dogs with idiopathic epilepsy. The study population included dogs evaluated at a veterinary referral center and may not be reflective of the general population of dogs. Body weight and duration of seizures before initiation of anticonvulsant treatment were the only factors that were found to be statistically different between dogs that had an episode of SE and those that did not. Of these, body weight appeared to be the only identifiable risk factor, and dogs with a greater body weight were more likely to have an episode of SE. This difference in weight between the 2 groups may, in part, have been attributable to the high percentage of Labrador Retrievers in the study that had episodes of SE. However, when Labrador Retrievers were excluded from the analysis, a significant difference ($P = 0.025$) was still detected. It has previously been suggested that SE is more frequent in large-breed dogs, which is in agreement with our results. The reason for this is not known.

References

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