

# Understanding Your Pet's Epilepsy

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*"All the most acute, most powerful, and most deadly diseases, and those most difficult to be understood ... fall upon the brain."*

--Hippocrates

Epilepsy was recognized in ancient times and was undoubtedly one of the "difficult" diseases Hippocrates referred to. Understanding what causes seizures, how epilepsy is treated and how current research may help decrease the incidence of the disease, will help you deal with the condition in your pet.

## See your veterinarian

- Your veterinarian will be your best source for advice about your pet's health. They know your pet, what treatments have been tried in the past, what was found on examination, and your pet's other medical problems.
- Be an intelligent consumer. Educate yourself about your pet's disease and don't be afraid to ask questions. If you don't understand why a test is being run or a treatment recommended, your veterinarian will be able to explain why this will help your pet.
- Remember anyone can post anything on the Internet so there is no guarantee the information is valid unless it comes from a reputable source. Share what you learn with your veterinarian. They can help you distinguish information that may be helpful from ideas that may be useless or even dangerous for your pet's individual needs.
- The information in this site is provided to help you understand the things your veterinarian will be discussing with you and may help stimulate discussion of the options available.
- We cannot directly advise you on how to treat your pet. If your pet is having serious problems, you may wish to ask your veterinarian to refer you to a nearby Veterinary Neurologist (a specialist in diseases of the nervous system like epilepsy). To find a Board Certified Neurologist near you, go to the [American College of Veterinary Internal Medicine](#) homepage and search the "Find an ACVIM specialist near you" database. Information about the neurology service at the University of Missouri, College of Veterinary Medicine can be found at [www.vpth.missouri.edu](http://www.vpth.missouri.edu)



*Your veterinarian is the person to ask what's best for your pet.*

## Key points

If you have a pet with epilepsy, these are some of the key points for you to remember. They are discussed in more detail elsewhere:

- Don't change or discontinue medication without consulting your veterinarian.
- See your veterinarian at least once a year for follow-up visits.
- If your pet has a seizure longer than 5-10 minutes or 3 seizures in a day, seek veterinary care immediately.
- Be skeptical of exorbitant claims of treatments.
- Remember, live *with* epilepsy not *for* epilepsy. With appropriate treatment, most dogs have far more good days than bad ones. Enjoy all those good days! Enjoy your life and your pet. They have a serious disease, but don't let that keep you from enjoying the time you have with them.

## What is epilepsy?

Epilepsy simply refers to repeated seizures. Seizures may occur as a one time event in an animal from a variety of causes, but only if the seizures repeat again and again over a period of time do we call it epilepsy. Seizures are a sign of brain disease the same way a cough is a sign of lung disease. Saying an animal has epilepsy is like saying it has a chronic cough; it is a sign of a problem which isn't going away. Anything which damages the brain in the right area can cause epilepsy. If we can identify the cause of the seizures, say a brain tumor or a stroke, then we say the pet has symptomatic (or secondary) epilepsy. That is, the seizures are a symptom of a disease process we've been able to identify. If we've looked and can't find the cause, then we call it idiopathic (or primary) epilepsy. The term *idiopathic* simply means that we don't know the cause. It may be that the cause has escaped our attention; for example, a stroke that is too small to detect with routine brain scans or damage that occurred during whelping.

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*Epilepsy refers to repeated seizures over time. Idiopathic means we can't find an underlying cause of the seizures.*

Many of the idiopathic epileptics have inherited epilepsy: epilepsy caused by a mutation in a specific gene which they inherited from their parents. Dogs with idiopathic epilepsy frequently begin seizing at between one and three years of age, and certain breeds are predisposed to develop epilepsy. A few breeds have proven hereditary epilepsy, while in most it is just a strong suspicion. One of the goals of the Canine Epilepsy Project is to identify genes responsible for epilepsy in dogs. This will allow us to positively diagnose the hereditary form and take steps to decrease the incidence of epilepsy in dogs.

### How common is epilepsy?

Epilepsy is one of the most common neurologic diseases in dogs, but no one knows for sure just how common it is. Some studies estimate up to 4% of all dogs are affected. In some breeds, the incidence may be higher and some families may have up to 14% epileptics. Epilepsy occurs less frequently in cats and other pets, presumably because they do not have a hereditary form of the disease.

### What determines when my pet will have seizures?

No one knows what it is that determines when an epileptic will have seizures. The only thing we can predict about epilepsy is that it's unpredictable. Some pets appear to have seizures very regularly, while in others, the seizures appear to be precipitated by specific events such as stress, or changes in the weather. However, when we try to use what's happened in the past to predict when the next seizure may occur, we usually aren't very successful. For many epileptics, there is no pattern to their seizures.

### How do we diagnose idiopathic epilepsy?

Minimum work-up for an epileptic		
<b>History</b>	Your description of the character and timing of the episodes, relation to exercise, feeding, etc.	Helps your veterinarian determine if this is indeed a seizure and what type. May provide clues to the cause
<b>Physical examination</b>	Evaluation of the heart, lungs, abdomen, gum color, etc.	Provide clues to diseases which could cause seizures or complicate treatment
<b>Neurologic examination</b>	Evaluation of behavior, coordination, reflexes and nerve functions	Provide clues to disease of the nervous system which may be causing the seizures
<b>Complete blood count (CBC), routine serum chemistry profile, and</b>	Blood and urine samples are taken and analyzed	Rules out metabolic causes of seizures and provides baseline data to monitor

Idiopathic epilepsy is a diagnosis by elimination. That is, we look for other causes of seizures and if we can't find any, we make the diagnosis of idiopathic epilepsy. How aggressively we search for an underlying cause is a matter of clinical judgement. We always recommend a minimum work-up for any dog having seizures. This will provide us with clues to a possible underlying disease and provide the baseline from which to watch for potential side effects of antiepileptic drugs.

urine analysis (UA)		effects of medication
Bile acids assay or ammonia tolerance test	Usually, the pet is fasted and two blood samples are taken	Rules out liver problems and provides baseline data to monitor effects of medication
Thyroid function tests	Blood samples analyzed for T4 and TSH levels	Optional, but would rule out thyroid disease as a cause

Since your veterinarian may not witness one of your pet's seizures, they are very dependant upon your description of the episode. This will help them decide whether these events are indeed seizures. Other problems such as fainting or dizzy spells can also come and go like seizures and may look similar to the untrained eye. Thus, your veterinarian will need a clear description of what you observe during the episode to help make that distinction. They will also be determining what type of seizure your pet is experiencing. Write down a description of what you saw as soon as possible after the episode. If you can, make a videotape of the episode to show your veterinarian or the neurologist.

In order to rule out some diseases, we would need further tests. If the animal is outside the 1-3 year old range when idiopathic epilepsy typically starts, or has any abnormalities on examination that hint of a cause, we strongly recommend such testing. Your veterinarian may refer you to a neurologist for some of these tests. Even if an animal is within the "idiopathic epilepsy" age range, we can't be sure it's idiopathic unless we perform the full compliment of tests. One study (Podell 1995) showed that over 1/3 of the dogs between 1 and 5 years of age had an identifiable cause for the seizures. Thus we can make a case for aggressive testing in any epileptic dog, but need to weigh the additional cost involved into the equation.

The electroencephalogram (EEG) is a useful tool in diagnosing epilepsy, but has serious drawbacks in animals. When we see abnormalities in the EEG, that tells us this is indeed a seizure and may help us pinpoint the source. The trouble is, those EEG abnormalities, like the seizures, can come and go. If they don't happen while we are recording the EEG, we will not see them. Recording an EEG in an awake animal is difficult, so we often have to sedate or anesthetize them to get an adequate recording. The drugs used for the sedation/anesthesia also affect the EEG. Thus, we often make the diagnoses of epilepsy based on the clinical signs and don't require EEG confirmation of the disease.

Other tests that may be recommended (may require referral to a neurologist)		
MRI or CT brain scan	Evaluate the structure of the brain; requires anesthesia	Rules out diseases such as brain tumors which would need to be treated directly
Spinal tap	Spinal fluid is collected and analyzed; requires anesthesia	Looks for infectious diseases and provides clues to other brain diseases
Antibody titers	Blood and/or spinal fluid is analyzed for antibodies	Identifies specific cause of an infection
Toxin tests	Blood or other sample is tested for the presence of a toxin	Tells if a specific toxin is present, but usually need a clue to what toxin to look for from the history or other test
Other laboratory tests	Advanced tests on blood, urine, or spinal fluid	Follows clues suggested by routine tests
Electroencephalogram (EEG)	Recording of brain wave to look for the electrical storm	Allows definitive diagnosis, but can be non-diagnostic

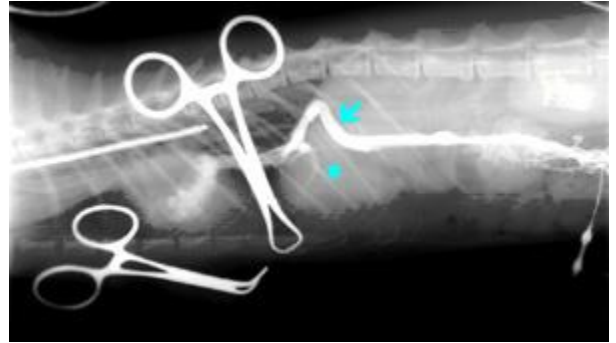
### **Thyroid function and epilepsy**

There is a great deal of controversy (largely unnecessary) about the role of the thyroid in canine epilepsy. The thyroid hormones regulate metabolism. Too much thyroid activity, and the metabolism runs too fast. The result is weight loss, nervousness, high blood pressure, and so on. Too little thyroid activity, and metabolism runs too slow. This results in weight gain, lethargy, high cholesterol levels, and so on. Normally, dogs don't develop atherosclerosis: the hardening of the arteries that predisposes people to heart attacks and strokes. The high cholesterol that accompanies hypothyroidism (too little thyroid hormone) can, however, lead to atherosclerosis and strokes in dogs. Likewise the high blood pressure that accompanies hyperthyroidism (too much thyroid hormone) can also predispose the dog to stroke. So the dog needs "Goldilocks levels" of thyroid hormone: not too much, not too little, but just right. If the levels are outside that range, then we could have problems which could cause epilepsy.

Thyroid function tests are affected by many things, including stress and medications. Several recent studies have demonstrated that phenobarbital therapy causes falsely low values on some thyroid tests. Recent seizures will also cause false lowering of the values, presumably due to the stress they cause. So test results need to be interpreted with these caveats in mind. If an animal tests truly low on thyroid function, then a trial of thyroid supplementation is indicated. If an animal has normal thyroid tests or fits with what we expect from the effects of the medication or seizures, then there is no reason to supplement thyroid hormones.

### ***What about liver shunts?***

One of the jobs of the liver is to ensure that only the good stuff from the food we eat gets into the body. Dogs are notorious for eating disgusting things, such as the moldy cheese out of the garbage, and their liver is responsible for keeping toxins from affecting the body. In addition, the action of bacteria in the intestines on food can produce toxic byproducts which the liver deals with. All the blood coming from the intestines goes through the liver first, where it is cleansed of toxins before going around the rest of the body. When an embryo is safe in the mother's womb, the mother's liver takes care of that job, and the embryo doesn't need to worry about it. As a result, the blood from the intestines bypasses the liver in the embryo through a separate vessel called a shunt. When the pup is born, however, the liver needs to switch gears and start doing its job of cleaning the blood from the intestines. So the shunt closes down and blood is run through the liver to be cleansed before it gets to the brain.



*In this radiograph, blood (shown in white) flows through a shunt (arrow) bypassing the liver (star).*

If the shunt fails to shut down like it should, then blood will continue to bypass the liver. A shunt that is present from birth is called a congenital shunt. The liver then doesn't get a chance to remove the bad stuff until it's already circulating around the body. Many of the toxins that the liver would normally clean up can affect the brain, and seizures can be one of the effects.

Shunts can also be acquired later in life. If the liver is diseased, blood may have a hard time flowing through the sick liver, leading to a back-pressure in the vessels coming from the intestines. If that back-pressure gets high enough, the blood may find an alternative, less resistant, pathway. The result is the same as the congenital shunt; blood bypasses the liver and toxins affect the brain.

Both because liver problems can cause seizures and because many of the medications used to treat epilepsy can injure the liver, we recommend liver function tests as part of the initial work-up and as part of the regular check-ups. The liver enzyme tests which are part of a routine chemistry profile may not be adequate to detect liver shunts and liver function tests, such as bile acids or ammonia, are necessary.

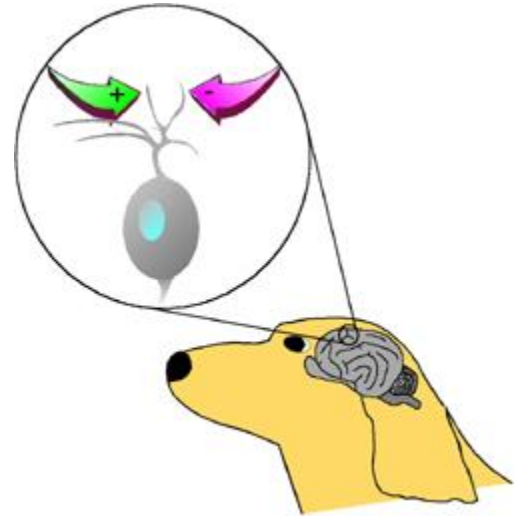
### ***Other tests may be necessary***

Depending upon your pet's age, type of seizure, and findings on the minimum work-up, your veterinarian may also recommend further tests. Advanced imaging, such as MRI or CT scans, is necessary to be able to actually see the brain. Regular radiographs (X-rays) can tell us about the bones of the skull, but not the brain itself. Such imaging is becoming more readily available for animals at referral centers. By imaging the brain, we can diagnose diseases such as brain tumors or hydrocephalus (water on the brain) which can cause seizures.

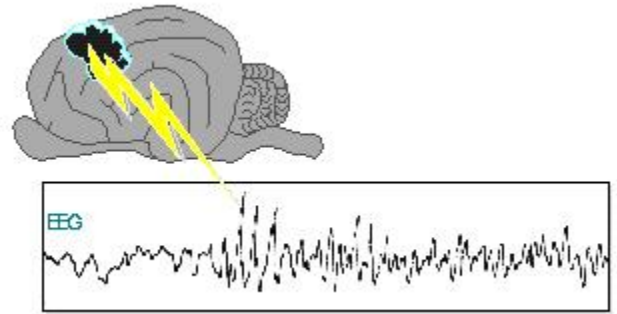
Infection of the brain (encephalitis) can cause seizures. Canine distemper is the most common cause of encephalitis in dogs and one of the reasons to keep your pets current on their vaccinations. A spinal tap and serum antibody titers will enable your veterinarian to tell if distemper or one of the other causes of encephalitis is the reason for your pet's seizures. Additional blood tests including toxin screens may also be indicated.

## What is a seizure?

Seizures are caused by an electrical storm in the brain. Normal brain cells (neurons) use electrical and chemical signals to communicate with each other. This communication can either be **excitatory**, tending to activate the next neuron, or **inhibitory**, tending to shut the next neuron off. A delicate balance of these excitatory and inhibitory influences on any given neuron determines whether it is going to become activated and pass information on to other neurons. If the balance within the brain shifts too far toward excitation, too many cells may become too excited and a seizure can result. Keep in mind, we are talking about excitation or inhibition of individual neurons in the brain, not whether your pet's excited to see you when you get home. In fact, seizures in dogs occur most commonly when the pet is relaxed or asleep, although they can occasionally be associated with exercise or emotional arousal.



We can see this excess excitation if we record the electrical activity of the brain through an electroencephalogram (EEG). On the EEG, the seizure will appear as a series of sharp spikes as waves of excitation overtake the brain. This electrical storm then causes changes in the behavior and movement of the animal which we recognize as a seizure. There are several different types of seizures depending upon the nature and location of the electrical storm.



## Types of seizures

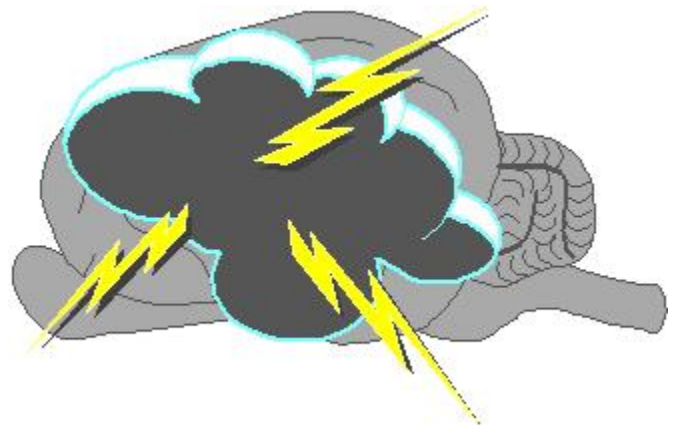
Seizures are broadly divided into two types; **generalized** and **focal** (or partial) seizures. In a generalized seizure, the electrical storm appears to arise everywhere at once. In a partial seizure, the abnormal electrical activity arises in a small area of the brain. Since your veterinarian may not see one of the seizures, they will rely on your description of what your pet does during the seizure to help them classify it. The descriptions provided here will help you understand the types of seizures, but don't jump to conclusions. Describe for your veterinarian or the neurologist exactly what you observe.

*An imbalance can cause an electrical storm in the brain which we see on the EEG.*

### **Generalized, tonic-clonic (grand mal) seizures**

Generalized seizures are further divided into two sub-types: major motor seizures (grand mal) and absence seizures (petit mal). The major motor seizure is the classic seizure. It is also sometimes called a tonic-clonic seizure. A classic seizure can have three phases, the aura or prodrome, the seizure itself (sometimes called the ictus), and **post-ictal** (post-seizure) behavior. Not all seizures have the three phases, but commonly they will.

The most common time for a dog to have a seizure is when they are relaxed and quiet. They may even occur from a sound sleep. Seizures can occur anytime, but if they occur only when an animal is excited or exercising, it may indicate a heart problem or low blood sugar.



*Generalized seizures begin over the entire brain simultaneously.*

Just as some dogs can sense when their epileptic owner is going to have a seizure, some owners can sense when their epileptic dog is going to have a seizure. The **aura or prodrome** is a recognizable change in the pet's behavior that alerts the owner to an impending seizure. Most commonly, the pet that has an aura will

act upset and anxious. He may seek attention from his owner or withdraw and hide. This aura may represent a focal beginning of the seizure and thus indicate a focal seizure, but we commonly see it in generalized seizures as well.

The classic seizure itself is called a **tonic-clonic seizure**. It begins with a stiffening of the muscles (the tonic part). Usually the pet will fall to their side with the legs stretched out and the head back. Once the seizure has begun, the pet is no longer conscious even though his eyes may remain open. Sometimes they will vocalize or the face may twitch. The vocalizations are involuntary and do not indicate pain. Often he will drool excessively or he may urinate, defecate, or empty his anal glands causing a foul smell. He has no control over these "accidents" and is completely unconscious during the seizure. This tonic phase is usually very brief (less than 30 seconds) and gives way to rhythmic movements (the clonic part). Typically this consists of chomping of the jaws and jerking or running movements of the limbs. Often he will not breathe well during the seizure and the tongue may turn blue. Even though the seizure may seem to go on forever, the average seizure lasts less than 2 minutes. If the seizure goes on much longer, we become concerned that the pet may go into a continuous seizure (an emergency situation).



*When the seizure begins, the dog stiffens and falls; They then begin jerking movements. They are not in pain during the seizure and cannot control their bladder or bowels.*

### ***Post-ictal behavior***

Following the seizure, the pet may lay motionless for a period of time. Eventually they get back on their feet. He may bounce back and be perfectly normal afterwards, but more typically there is a period of post-ictal behavior. Often the pet appears blind and disoriented during this post-ictal phase. He may pace or run about the house, bumping into things as he goes. Sometimes they are excessively hungry and will devour any food available. Rarely, a dog may behave aggressively during this period, especially if they are restrained. While such aggressive behavior is rare, it is important to recognize the possibility, especially if the dog is large and there are children in the household. Usually this post-ictal behavior begins to resolve within a few hours after the seizure and the dog gets back to normal.

### ***Variations on the theme***

Not all generalized seizures follow this pattern. Some won't show any aura but strike out of the blue. Some pets bounce back immediately after the seizure as if nothing had happened, while others may be disoriented for days. Some may show only tonic rigidity during the seizure itself, while others may show only clonic jerking and paddling. More rarely still, the pet may simply drop limply to the ground and lay motionless. A "drop attack" like this is more typical of a fainting spell, but can occur with seizures.

### ***Cluster seizures and status epilepticus***

Most seizures are brief and isolated, but sometimes they can be more serious. The large-breed dogs tend to have clusters of seizures. In these cases, the dog will have one seizure and recover from it. Then a few hours later, they have another. They never completely recover before another seizure strikes. Then they have another seizure, then another seizure, then another, another, another.... Sometimes this culminates in a continuous seizure that doesn't stop, a condition called **status epilepticus**. Occasionally status epilepticus can arise out of the blue; the animal begins seizing and never stops. Either way, this is a true emergency requiring immediate veterinary care. (See what do you do if your pet seizes).

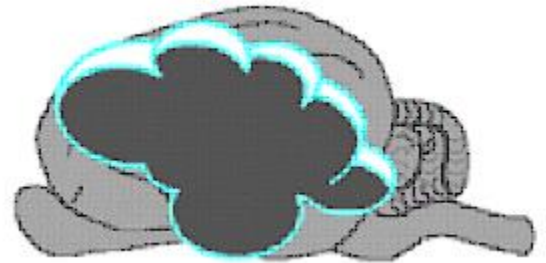
### ***Effects of seizures***

Most seizures are brief, and with proper treatment, the pet can lead a normal life. None-the-less, seizures are serious business and even short seizures can cause brain damage. That damage tends to be cumulative over time. If the seizures are short, the main effect is an increased chance of another seizure in the future. Thus, there is a tendency for epilepsy to get worse over time, especially if left untreated.

If a seizure goes on for more than 30 minutes, the pet is liable to suffer serious permanent brain damage. This can be manifest as a change in personality, or loss of memory for things such house breaking. Occasionally the pet may be left in a coma from the seizures. The seizure also creates a tremendous stress on the heart and other organs. The body temperature may get very high from all the muscle activity and the animal may not breath adequately. Sometimes the stress is too much and the pet may have a heart attack and die. Fortunately this is rare.

### **Absence (petit mal) seizures**

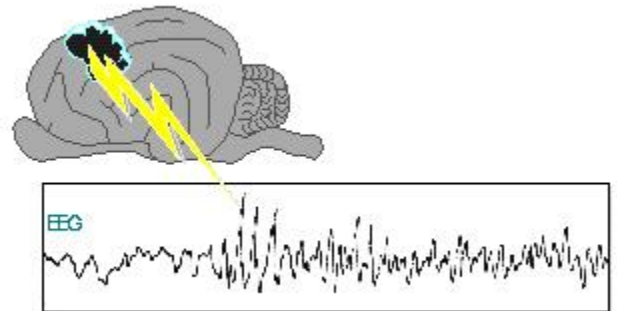
The other type of generalized seizures in people is the absence or petit mal seizure. Petit mal seizures differ from other seizures in several important aspects. First there is little movement during a petit mal seizure. As the name "absence" implies, the person simply loses contact with the world during the seizure. They stare blankly and may blink but do little else. Absence seizures are also different in that they probably represent a storm of inhibition rather than a storm of excitation within the brain. This creates a unique EEG pattern. This means that very different drugs are used to treat petit mal seizures. We're not sure if petit mal seizures really occur in pets. Most of the seizures that are called petit mal seizures in pets are actually focal seizures.



*Petit mal or absence seizures cloud consciousness without convulsions. They don't appear to occur in pets.*

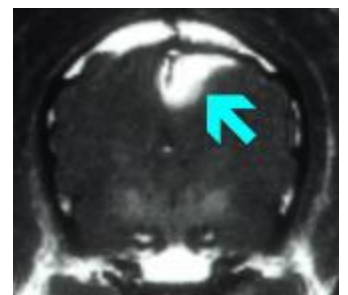
### **Focal seizures**

In focal or partial seizures, the electrical storm begins in an isolated area of the brain. If we are recording an EEG at the beginning of such a seizure, we can see the storm starting in one part of the brain. A focal seizure may stay localized, or it may spread and affect the whole brain causing a classic, generalized, tonic-clonic seizure. In some cases, the aura preceding a generalized seizure may actually be a focal seizure. The fact that the seizure starts in a local area suggests that localized damage has occurred. As a result, when we see focal seizures, we are more worried about diseases which will cause local damage, such as a brain tumor or infection. focal seizures are further divided into two subtypes (simple or complex) depending on where the storm originated and how it affects the pet.



*A focal seizure begins in a localized brain area which we can detect with the EEG.*

### **Simple focal seizures**



*This MRI scan of the brain shows a tumor*

Simple focal seizures (also sometimes called minor motor or focal motor seizures) *in a dog having* originate in the area of the brain that controls movement. A localized storm in this *simple focal seizures.* area results in movement of the area of the body controlled by that part of the brain. Most commonly, the face is affected resulting in twitching or blinking. This is usually limited to one side of the face. If the seizure spreads a bit, other parts of the body on that side will be affected. For example, the front limb may then begin to twitch and buckle. During a simple focal seizure, the pet is usually alert and aware. They may attempt to seek out their owner, confused about what is happening. The seizure may stop there or it may generalize. If it generalizes, the pet loses consciousness and has a classic grand-mal seizure.

### ***Example of a focal seizure***

Here is a video clip which shows a focal seizure. Watching this clip may upset some people. We present it because we think it is important for owners to be able to accurately describe to their veterinarian what type of seizure their pet is having. The dog pictured suffered from a brain tumor and was receiving intravenous medications to stop the seizures while the tape was being made; hence the white bandage on the arm. The seizure consists of twitching of the face and jerking of the head. Note that the face twitching occurs primarily on the left side of the face. Click [here](#) to begin video. This clip is 4,700 kb and thus may take quite a while to load. You may wish to finish reading and come back to the video when your done.

### ***Complex focal seizures***

Complex focal seizures originate in the areas of the brain that control emotions and behavior (the temporal lobes) and are sometimes called psychomotor seizures. When a seizure begins in one of these areas, the animal's consciousness is altered and they behave bizarrely. They may run uncontrollably, engage in senseless, repetitive behavior, or rarely fly into a rage. Other times, we see bodily functions affected and the pet may have diarrhea or vomit. Following a typical [generalized](#) seizure, unusual behavior ([post-ictal](#) behavior) is common and may go on for hours. Complex focal seizures, like other types of seizures, are typically very brief.



Most often, an animal behaving aggressively or acting strangely has a behavioral problem or some other reason for the change in behavior. If, however, these changes occur as discrete episodes, and the pet also has a generalized seizure, we can be sure that this is a complex focal seizure and treat it accordingly. People with complex focal seizures may experience hallucinations. Some dogs have episodes of [fly-biting](#) where they appear to be biting at imaginary flies around their head. Some of these may be complex focal seizures although we cannot tell for sure.

*Most aggression is a behavior problem and a behavior specialist should be consulted.*

### ***What else looks like seizures?***

There are other conditions which can cause episodes which might be confused with seizures. Dogs with severe ear infections may develop inflammation of the inner ear (vestibular system) and dizzy spells. Dogs with heart disease may have fainting spells. There is a sleep disorders which cause episodes of collapse or excess movements during dreaming. A thorough history and physical examination by your veterinarian should allow them to distinguish between these conditions and epilepsy. There are also disease which are more properly classified as movement disorders which can look very similar to epilepsy. See [Chinook "Seizures"](#) for a discussion of these diseases.

### ***What causes seizures?***

Many things can tip the balance between excitation and inhibition in the brain toward too much excitation. Keep in mind, we're talking about the excitatory influences on nerve cells in the brain, not the dog's



emotional state. Once a certain threshold of excitation is passed, any animal may seize. Things that can push an animal past that threshold include toxins, metabolic diseases, and direct damage to the brain.

Some plants have evolved **toxins** which cause seizures as a defense against insects or other plant eating animals. If your pet eats such plants, they could be similarly affected. We utilize some of these plant toxins and related chemicals as insecticides to protect our pets from fleas and our tomatoes from horn worms, and these insecticides can cause seizures if used inappropriately. Other toxins, such as lead and some industrial chemicals, can also cause seizures. Thus your veterinarian will need to know about potential exposures to these compounds if your pet has a seizure.

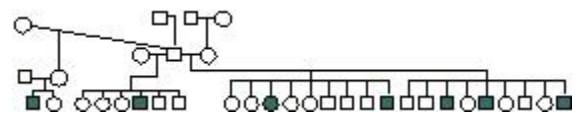
The **metabolic state** of the pet will also influence the brain and can secondarily cause seizures. If the brain doesn't get an adequate supply of oxygen and nutrients to fill its needs, the excitability of the cells may increase and seizures result. Thus low blood sugar or heart disease may cause seizures. Electrolytes (different salts normally present in the body) play important roles in brain function. Alterations of these electrolytes (particularly sodium and calcium) can cause seizures. Low calcium levels can be a problem in a nursing mother. Toxic byproducts are constantly being produced in our body from normal activities of the organs. The liver and kidneys have the job of getting rid of these toxic byproducts. If either of these organs isn't able to do its job, these byproducts can accumulate and seizures may be one of the results. If your pet is having seizures, your veterinarian will recommend blood tests both to determine if one of these metabolic disease is the cause and to provide a base line to watch for potential side effects of the antiepileptic drugs which may be used.

**Physical damage** to certain areas of the brain can produce an epileptic focus. This is a small area of the brain that initiates focal seizures which in turn can lead to generalized seizures. We don't know how local damage causes the electrical storm in that area, but we do know that many types of damage can have this effect. Thus head trauma, brain tumors, infections in the brain (encephalitis), strokes, just about anything that damages the brain can lead to seizures. If your veterinarian suspects such brain damage as the cause, they may refer you to a veterinary neurologist for brain scans, spinal taps or other tests to be sure there isn't a brain tumor or other explanation for the seizures. We become especially worried about such acquired damage if the dog falls outside the age range where we typically see hereditary epilepsy, that is if they are less than a year or more than 3-5 years old. Sometimes removing the cause of the damage cures the epilepsy. Other times, the damage has been done, and even if we can remove the tumor or control the infection, the pet is left with epilepsy. Even if we don't cure the epilepsy, the seizures will be easier to control without the continuing damage from an untreated tumor or infection. In addition, such a disease left untreated may well cause other, potentially even more serious problems.

## Hereditary epilepsy

Any animal may have a seizure if the "seizure threshold" is passed by too much excitation in the brain. In addition to the external metabolic influences, there are internal factors in a neuron that regulate how excitable that cell is. The makeup of all the internal machinery of the neuron and its interactions with its neighbors is determined by the genetics of the animal. A mutation in certain genes can cause these cells to be more excitable and thus more likely to slip over the threshold into seizures. We presume that this is the basis of hereditary epilepsy, but until we find the genes responsible, we won't know for sure. Even dogs with hereditary epilepsy only seizure intermittently. Other influences that we don't understand regulate when that lower seizure threshold will be crossed and an actual seizure occur.

Epilepsy has been proven to be hereditary in several breeds and it is suspected in numerous other breeds. Right now, we don't know exactly how epilepsy is inherited in dogs. It may well be that there are different modes of inheritance and different genes involved in various breeds and families. Preliminary results from the [Canine Epilepsy Project](#) suggest that there are two or more genes involved in some of these families. There are several genes associated with epilepsy in humans and mice, and these genes are being investigated as possible candidates for the culprit



*When we see multiple epileptics in a family, we begin to worry that it may be hereditary. In this pedigree, epileptics are shaded.*

in canine epilepsy. You can help with this project by alerting us to families with epilepsy which fit the [criteria for useful research families](#).

## **How is epilepsy treated?**

Ideally, we would like to be able to remove the cause of the epilepsy so that the animal will never seizure again. If the epilepsy is symptomatic, sometimes treating the underlying disease (for example, removing the brain tumor) will cure the epilepsy. More often than not, we either can't find the cause (idiopathic epilepsy) or even if we can find and eliminate the cause, some damage has been done and the epilepsy continues. Then we need to use medications to control the seizures.

### ***Goals of therapy***

Antiepileptic drugs do not cure epilepsy; they simply control the seizures. Since we are controlling the seizures rather than eliminating the disease, plan on life-long therapy. The goal of therapy is to decrease the number and severity of the seizures. In particular, we strive to eliminate the clusters of seizures which can create life-threatening situations. Even a well controlled epileptic will have seizures now and then. If we can decrease the frequency and severity of the seizures to a tolerable level without producing side effects of the medication, we consider that a success. Epilepsy is successfully controlled in over 2/3 of the epileptics treated. While not bad odds, that leaves entirely too many patients that still have difficulty with seizure control.

Patience is necessary when treating epilepsy. Antiepileptic drugs are not "one size fits all" medications. They need to be individualized to your pet's specific needs. Often this requires some trial and error to find the medication and dose that works best for your pet. This "perfect balance" may also change with time. When we start medication or alter the dose, it takes time for the drugs to have their maximum effects. There will be some seizures even with the medication, and we need to see how frequently the seizures are occurring to judge just how effective the medication is. Patience is hard to come by when your pet is having terrible seizures, but if your veterinarian advises you that you must wait things out, it may be necessary to do so.

The objective of treating epilepsy is to tip the balance of excitation and inhibition in the brain toward less excitation. The most commonly used drugs in dogs are phenobarbital, potassium bromide, and diazepam. These drugs may be used separately, but sometimes combinations are needed. They all act to increase inhibition in the brain, thus making seizures less likely. This increased inhibition comes at a price, however, and all the antiepileptic drugs may have side effects such as sedation and appetite stimulation.

### ***When do we begin treating?***

Any decision to begin a therapy involves weighing the risk of not treating the disease against the risk of side effects of the medication. Many factors weigh into this decision, but in general, if a pet is having more than one seizure every couple months, risk of brain damage and worsening of the epilepsy tips the scales toward treating. If the pet has had clusters of seizures or status epilepticus, then we are very concerned about the risk of a life threatening seizure as well. Other factors we take into consideration include the general health of the pet, the home environment, and economic considerations.

### ***Will I ever be able to stop treating?***

Most epileptics require life-long therapy to control their seizures. Occasionally we have animals that can be weaned off medication and don't seize again. These are usually the cases where a cause of the seizures was identified and treated, but sometimes we get lucky with other cases as well. We need to be very patient, though, before deciding that an animal can come off medication. If the medication is doing it's job, the pet may have very few seizures, thus we want to see them go for many months without a seizure before we start to ask if they need the medication or not. If we do decide to try withdrawing treatment, we must do so

very slowly and be ready to go back if problems develop. Your pet becomes dependant upon the medication and stopping it suddenly could precipitate serious seizures.

**NEVER DISCONTINUE ANTIEPILEPTIC MEDICATION WITHOUT CONSULTING YOUR VETERINARIAN!!!**

## **What are the commonly used treatments?**

All the commonly used medications for epilepsy act in the brain to tip the balance away from excess excitation. The most commonly used drugs include phenobarbital, potassium bromide, and diazepam.

### ***Phenobarbital and primidone***

Phenobarbital is probably the most commonly used antiepileptic drug in dogs. In addition to being used on a daily basis to prevent seizures, phenobarbital (or its first cousin pentobarbital) is often used to stop seizures in progress. Primidone is another medication which is actually converted to phenobarbital by the body and thus acts virtually the same way. Phenobarbital is a very effective antiepileptic drug. It is not expensive and comes in liquid form as well as different size tablets. This makes it easy to come up with the correct dose for everything from a Chihuahua to a Great Dane. It works well in dogs because it stays in the body long enough that it usually only has to be given twice a day.

Most pets have very few side effects on phenobarbital. When we first start them on the medication, we expect them to be a bit sedated and a little unsteady on their feet, but usually they develop a tolerance to the sedative effects within a few days. Sometimes the dose needs to be increased to control the seizures, and then the dog may have side effects again. The sedative effects are the main reason phenobarbital isn't used more often to treat people with epilepsy. If the child falls asleep at school, or the parent falls asleep driving home from work, that's a problem; if the dog wants to nap in the afternoon, that's usually not so bad.

The other common side effect is a stimulation of thirst and appetite. Decreased activity plus increased food intake, can equal obesity. It is important to watch their food intake so that they don't become overweight.

Phenobarbital is eliminated by the liver and this can take its toll on the liver over time. Some dogs may develop liver damage with long term use of the drug, but many dogs never have any liver problems. Monitoring liver function tests on a regular basis will help avoid potential problems.

### ***Potassium bromide***



***In 1857, Queen Victoria's physician found that bromide***

Bromide was actually one of the first antiepileptic drugs discovered dating back *helped epilepsy.* to Victorian times. It was largely abandoned by physicians when phenobarbital was invented because it caused psychological problems in people. It was rediscovered by veterinarians about 100 years after it's first use in people and it has proven to be a valuable antiepileptic drug in dogs. Dogs do not appear to suffer the psychological side effects of bromide that people do.

Because it has been around for so long and is seldom used in people anymore, bromide has never received the FDA (Food and Drug Administration) stamp of approval as a drug. Since no one can patent its use, it is unlikely that any pharmaceutical company will go through the trouble and expense of getting bromide approved. Veterinarians obtain special permission from the FDA to use it. Although it has never gone through the rigorous testing required by FDA for approval, bromide has been used in dogs for a long time now, and has proven to be a reliable drug.

Bromide is combined with either potassium or sodium (KBr or NaBr respectively) to form a crystal that looks like table salt. This powder can be packaged into capsules, but is much easier to simply mix it with water to form a solution. This solution is very stable and does not need to be refrigerated. The liquid also has the advantage of making adjustments in the dose easy. Since bromide can have bad effects on people, handle it cautiously. Keep the solution away from children and avoid getting the solution on your skin.

Bromide has a very long half life; that is, it takes a long time for the body to eliminate the drug. This means that we usually only need to give the drug once a day which makes it very convenient. It also means that it takes quite a while from when we begin the drug, until we see the maximum benefit of it. We can get quicker results by giving a much higher dose (a loading dose) initially, but we may see more side effects if we do. So generally we take our time and only do the loading dose when necessary. Because the bromide hangs around so long in the body, we also need to watch the dose and monitor the blood levels to avoid overdoing it.

The amount of salt in the diet can influence how quickly bromide is eliminated from the body. Thus a dog receiving bromide therapy should remain on a consistent, quality dog food diet and salty treats (which includes most table scraps) should be avoided.

Bromide can sometimes cause an upset stomach, and thus it is best given at meal times. The liquid can be mixed with food as long as the dog will eat it all. If the dog is a picky eater, mix the bromide with a little food and wait until that's gone to give the remainder of meal. Alternatively, simply give the liquid directly into the dog's mouth.

Bromide can cause drowsiness and stumbling like phenobarbital. Usually we only see this when we first begin the medication or at higher doses. The dogs usually develops tolerance to the sedation with time, and if not, decreasing the dose can correct the problem. Sometimes the higher dose is needed to control the seizures and then we're faced with deciding between the lesser of two evils. Increased appetite is also common. Rarely skin problems have developed.

### ***Diazepam and related drugs***

Diazepam is the generic name for Valium. Most people think of Valium as a tranquilizer, but diazepam is also a very effective drug for treating seizures. The trouble with diazepam is that if it is given daily, it tends to lose its effectiveness over time. As a result, we usually reserve it for stopping a seizure in progress rather than using it as a daily, preventative medication. We occasionally use diazepam or one of the related drugs (clonazepam or clorazepate) on a daily basis, but only when other medications are not working alone.

The best way to give diazepam to stop an active seizure is by an intravenous injection. Diazepam can also be very effective when given per rectum. This refers to giving the medication into the rectum (like a suppository) where it is rapidly absorbed through the membranes. Suppository forms of diazepam are available, but they are fairly expensive, so we usually just use the liquid form that is used for injections. It's not the most pleasant way to administer medication, but this approach can often help dogs that have

clusters of seizures. By giving the diazepam at home when the dog begins their cluster, further seizures can often be prevented, thus saving an emergency trip to the veterinarian.

### ***Newer antiepileptic drugs***

Many pet owners know a human epileptic who is taking Tegretol, Depakote, Dilantin or other medications for their epilepsy with good success and wonder why those drugs are not used for their dog. Dogs and people are different in ways besides how furry they are and how many legs they walk on. The way a dog eliminates drugs from the body may be very different from a person. For many of the newer antiepileptic drugs that work well in humans, dogs eliminate them from their bodies much quicker than people do. Thus in order to receive the same benefits, a dog would have to take the drug more frequently than a person would have to take it. Combined with the high price tag for these new drugs, this often makes them impractical. One of the newer antiepileptic drugs, lamotrigine, can be toxic to dogs even though it is not toxic to people. Still, we are constantly looking for better treatments for epilepsy in dogs, and several are currently being evaluated. Some of the newer drugs which may prove useful in dogs are felbamate, gabapentine and topiramate, but the jury is still out, and they should only be considered when conventional treatments fail.

### ***Other treatments***

Other treatments are also being looked at for treating epilepsy. These include surgery, vagal nerve stimulation and special diets.

Surgery will be of definite value if we are dealing with epilepsy secondary to something like a brain tumor where removing the cause might cure the epilepsy. In human medicine, they can sometimes identify a focal source of the epilepsy (the epileptic focus) even when it is not a clear, structural lesion like a tumor. Surgery to remove the epileptic focus is sometimes attempted if these people have intractable epilepsy. While such surgeries have sometimes been successful in humans, they are still experimental in canine epilepsy.

The vagus is a large nerve in the neck that brings sensory information from many of the body's organs to the brain. Stimulating the nerve electrically, much the way a pacemaker is used to stimulate the heart in some heart disease, may help to control epilepsy. This approach is currently being studied to see if it will work in dogs.

In people, a diet very high in certain fats will produce a condition called ketosis and is called a ketogenic diet. The ketogenic diet can help control some seizures in people, but has not yet been shown to help epileptic dogs. Such a diet has to be carefully planned to make sure that other essential nutrients aren't short changed and simply adding excess fat to a dog's diet will make them obese without benefiting their epilepsy.

### ***Side effects of antiepileptic drugs***

Most epileptics experience very few side effects of their medication. When side effects do occur, they are usually mild and are far outweighed by the risk of further seizures if we don't treat the epilepsy. Because they increase inhibition in the brain, the drugs tend to be sedatives. This is particularly apparent when the medication is started or when the dose is increased. The dog may be lethargic and want to sleep all the time. The drugs can also affect coordination causing the dog to stumble and weave as if drunk. Most dogs develop a tolerance to the sedative effects of the drugs within a week of beginning them or increasing the dose. Thus if these signs are mild, we will usually try to wait them out and usually within a few days, they improve. Sometimes, decreasing the dose of the medication is necessary, but we always weigh the risk of more seizures into the decision.

**NEVER CHANGE THE DOSE OF ANTIEPILEPTIC MEDICATION OR DISCONTINUE IT WITHOUT CONSULTING YOUR VETERINARIAN!!**

The animal on antiepileptic drugs becomes dependant on the medication and sudden decreases in the dose can precipitate serious seizures. When a medication is discontinued, this must be done gradually if the dog has been on it for any length of time.

Occasionally, dogs have a paradoxical reaction to the medication. Rather than becoming sedated, the dog becomes restless, agitated and rarely irritable. They may pace around the house unable to relax or sleep. Why some animals respond this way is not known, but usually adjusting the dose of medication eliminates the problem.

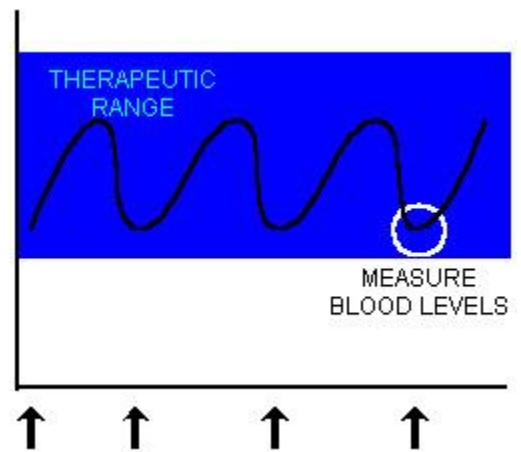
Another common side effect is an increase in thirst and appetite. The increase in thirst will be accompanied by a need to get outside more often to get rid of the excess water. Due to the appetite stimulation, some epileptics will become obese if allowed to. **DON'T LET THEM!!** We need to watch their weight and control their diet to keep the weight reasonable. Obesity creates stress on the heart and other organs in dogs, just like it would in people, and an epileptic doesn't need extra stress on their body.

Because we usually need to treat the epilepsy for life, we need to monitor for potentially serious effects of the drugs. Such serious side effects are uncommon, and by watching for them we can often see them coming in time to avoid them. Of most concern is the potential for liver or bone marrow damage by some of the drugs. We recommend performing liver function tests (such as bile acids or ammonia) and blood counts at least once a year, often more frequently.

### **Monitoring blood levels**

Antiepileptic drugs are not "one size fits all" medications. We need to optimize the treatment for your companion's individual needs. There are many things that influence how much of the medication we give the dog is actually available to do the job. By measuring the actual levels of the drug in the blood, we can better fine-tune our treatment to best control the seizures. This is particularly important when we first start the medication or if we are having difficulties with too many seizures or side effects. Even when the seizures are controlled, it is best to measure levels regularly so we have a baseline to compare to and can anticipate problems.

Even when a drug is given regularly, there is a bit a see-saw effect on the levels in the blood. Immediately after we give the medication, the level in the blood climbs as the drug is absorbed. Once it's all absorbed, the level in the blood gradually falls as the drug is eliminated from the body. The dose is timed so that there is always enough medication in the blood (and hence the brain) to control the seizures. Ideally, the dog's blood levels of medication will fall with the range of levels known to work without causing too many side effects. This is called the therapeutic range. When measuring blood levels, we are usually concerned that the level may get too low and allow the dog to seizure. Thus your veterinarian may recommend that you bring your pet in first thing in the morning or last thing in the evening, right before they're due for their next dose. This allows them to measure the lowest, or trough, level. By measuring trough blood levels, your veterinarian can give you the best advice on how to get the maximum benefit from the medication. Fasting your pet overnight before the blood tests will prevent fat in the blood from interfering with the accuracy of the tests. If you have a toy breed dog that is prone to low blood sugar, a diabetic, or other reasons why fasting might create problems for your pet, consult your veterinarian first.



*Blood levels rise after a dose of medication (arrows) and then fall again as the drug is eliminated. We usually measure the lowest (trough) levels right before the next dose.*

### **"Alternative" therapies**

Epilepsy can be a frustrating disease since in a few cases available therapies don't work well or have adverse side effects. This can lead owners to search for alternatives which might better help their pet. These may include treatments such as acupuncture, herbal remedies, homeopathic preparations or magnets. In the words of one philosopher, "there are only two types of therapies: those that work and those that don't." Labeling a therapy as "alternative" or "conventional", "homeopathic" or "allopathic" only sidesteps the real question: Does it work?

Epilepsy can be a highly variable disease. We routinely see epileptics who appear well controlled suddenly have a terrible month and conversely see epileptics who have been chronic problems suddenly smooth out and do well for a while. Such variability makes it easy to be fooled into thinking that a treatment is working or not working if we take too narrow or short term look at a therapy.

As a case in point, we recently evaluated a new treatment for epilepsy that theory and experimental studies suggested might be a good treatment. One of the first dogs we tried it on was a Labrador Retriever who was having severe seizures in spite of everything we'd tried before. The dog went 6 months without a seizure and we thought we were on to something. So we tried the treatment on more dogs. It failed miserably from then on out, including the first dog who did so well initially. We can't say why it seemed to work initially, but it was clear by looking at a number of dogs over a period of time, that it wasn't a therapy that worked. Thus the only way to say if a therapy is truly effective or not is to conduct a clinical trial and objectively see how it performs.

Most promotions for alternative therapies rely on testimonials; a few people's stories of how the therapy worked for them. This sort of approach leaves important questions unanswered.

- How was the initial diagnosis established? We've had people bring in everything from cats in heat to dogs with ear infections and say their pet was having seizures when really something else was going on.
- What criteria was used for "success"? If the dog only went a month or two seizure free, that may just be the natural variation of the disease and not an effect of the treatment.
- How many animals were treated and didn't respond? This critical piece of information is always conveniently overlooked in testimonial promotions. They quote the owners of that Labrador when he was doing well and forget the other 12 cases that did not succeed.
- How was the "placebo effect" controlled? People want to believe that the new therapy will be the answer for their pet. Thus even if the treatment is a placebo (a sugar pill or some other treatment that has no real effect), you typically see up to 30% of the animals improve. This is simply because we want to believe in the new treatment, and that colors how we look at the results. This is especially true if there is no firm measure of success established, and we rely on a subjective impression of whether the seizures are getting better or not.

### ***"There must be something to this ancient wisdom"***

The herbalist lore began with people's attempts to treat disease with the tools available. Much of our modern knowledge of therapy evolved from these treatments. It was clear that willow bark (aspirin) relieved pain, that foxglove (digitalis) helped heart disease, or that ma huang (ephedrine) relieved congestion. People attempted to explain these observations based on the knowledge of the time and developed theories that the shape of the plant somehow determined what effect it would have or that the treatment altered the flow of some unseen energy or "humor".



*People have sought to help their pets with their ailments since ancient times, but we have learned much since those times.*

Much of this ancient wisdom was, however, founded on ideas that had little basis in fact. Keep in mind that the same ancient wisdom that discovered ephedrine also maintains that rhinoceros horn cures impotence, pushing that species ever closer to extinction. The same ancient wisdom that discovered digitalis also maintained that blood letting was good for just about anything. After a while, people began to realize that blood letting was usually doing more harm than good, and to question why aspirin helped pain and why digitalis helped heart failure. The result was modern medicine where therapy is based on understanding as best we can what is really happening to the body in a disease and doing what we can to maintain health.

That understanding doesn't come easy. It is simpler to fall victim to wishful thinking that there is something mystical to these herbs and treatments that we don't need to understand. Still, we can use what was truly wise from these ancient treatments without turning our backs on the more recent wisdom.

An open-minded clinician doesn't reject a new approach to a problem just because it is different, but a wise clinician does not accept a new approach just because it is different. Some unconventional approaches (e.g. the ketogenic diet) are based on sound reasoning and show promise. There is ongoing research into herbal remedies to see if there are truly active compounds in the plants which could help. In general, whenever someone claims to have a new therapy of any kind for epilepsy, be it conventional or not, we take the Missouri philosophy - "Show me!"

### ***"If it's natural, it must be safe"***

Sassafras makes a delicious tea and was recommended as a tonic for a number of ailments. Trouble is, one of the major ingredients in sassafras causes liver cancer in rats. We tend to think of toxins as industrial chemicals, but plants were the original toxin factories. They produce a wide array of toxins either to protect themselves from being eaten, or simply as a byproduct of their everyday living. There is no way to know that this danger exists from looking at the plant, or tasting it, or even seeing what happens to someone who's just drunk sassafras tea. Only by scientific studies was it shown that this danger lurks beneath the sweet taste of sassafras. Granted, people aren't rats, but would you want to bet your liver that we're that much different?

Digitalis was long the mainstay of treating heart conditions, but it wasn't easy. There was a fine line between enough digitalis to help the heart and too much which could kill the patient. Many things can influence how much digitalis is in a foxglove extract. The potency was influenced by everything from the stage of growth when harvested, the weather conditions during growing, and the amount of insect damage the plant suffered; to the way the extract was prepared, and how long it has been stored. Thus extreme care had to be taken to ensure that the amount of digitalis that was given was indeed what we wanted. By looking at how digitalis both helped and hurt, we've been able to develop new drugs which can improve heart disease without some of the risks inherent to digitalis.

While some herbal preparations may be completely harmless, if they truly have effects on the body, there may also be harmful side effects. Drugs are only approved by the Food and Drug Administration after safety studies have established what side effects might be expected from the drug. Such studies are not done for "alternative" therapies and there is no guarantee that they will be safe. We recently saw an epileptic dog who was being treated with an herbal preparation which contained bella donna extract. The active drug in bella donna is scopolamine which has been evaluated by the FDA and shown to cause seizures! Not exactly a wise treatment for an epileptic.

Some alternative therapies, such as acupuncture, massage or magnets, have little potential to do harm in and of themselves. The danger lies in being lulled into rejecting a more rational approach to treating the problem. We tend to take modern medicine for granted and when the seizures finally abate, assume it was the acupuncture rather than the phenobarbital that was also used.

So be skeptical of claims for success with epilepsy treatments. Any treatments we recommend for our patients are backed by studies proving their effectiveness and carefully assessing their side effects. Don't settle for anything less.



## Living with an epileptic pet

### **Most importantly, LIVE**

Do what's enjoyable; all the things that make anyone keep a pet. You may need to make some adjustments to avoid dangerous situations, but go have fun with your companion! Concentrate on the time your pet is happy and doing well, rather than dwelling on the small percentage of time when there are problems.

Most epileptic pets can live relatively normal lives. We can successfully control epilepsy in over 2/3 of the cases. These dogs may require daily medication, but they can still run and play and love. Even the best controlled epileptic will still have some seizures, but usually we can keep their occurrence down to a tolerable level. The number of dogs who have serious side effects from the medications is very small. Some may experience sedation, but this does not prevent them from being loving companions. They don't need to stay awake in class or behind the wheel, so if they need an extra nap in the afternoon, who cares!



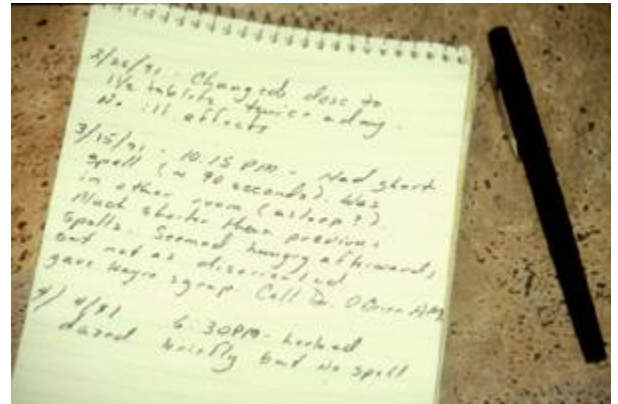
*Epileptic pets can lead happy, fulfilling lives.*

Unless the seizures are due to low blood sugar or heart disease, there is no reason to restrict exercise in your pet with epilepsy. While swimming carries some risk of drowning should the dog have a seizure while in the water, most seizures occur when the pet is relaxed and quiet or sleeping. Thus the odds of having a seizure while swimming are pretty remote. Canine life vests are also an option.

An epileptic needs a high quality, balanced diet. Any top quality commercial dog food will supply the needs of your pet. Diets based largely on table food or less expensive commercial foods may require supplementation to maintain optimum health in your pet. Consult your veterinarian for specific recommendations.

### **Keep records of seizures**

Keep a notebook or a calendar where your family can record when your pet has seizures. The goal of therapy is to reduce the number and severity of the seizures. The only way we can judge whether we are reaching those goals is if we know how frequent and how bad the seizures have been. Relying on memory isn't sufficient since it might be six months from now when we're deciding how to alter the medication. Write things down as they occur.



### **Be conscientious about treating**

Treating epilepsy isn't like treating many other conditions. Missing a dose or two of the medication could have dire consequences. Be sure you have a routine for giving the medication and know who's responsible for giving it. If more than one person in the family may be giving the medication, use a "weekly pill box". These are plastic boxes available at your pharmacy which contain a compartment for each day of the week. Simply load the week's medication in the compartments and then you will know if the medication has been given or not. When you go out of town, be sure the boarding kennel or pet-sitter knows how to give the medication properly. Plan ahead so that you never run out of medication. You don't want to be down to one pill on a Saturday night and be frantically trying to get the prescription refilled on Sunday morning.

*Accurate records will help your veterinarian judge the effectiveness of the therapy.*

Occasionally your pet may vomit right after receiving the medication. We generally recommend waiting a while so that they don't just vomit again, and then giving the medication again. Usually we are more concerned about them missing a dose than we are about giving a double dose. If in doubt about whether to repeat the medication or not, consult your veterinarian. Vomiting can also be a side effect of the medication, so consult your veterinarian if the vomiting continues. If your pet is unable to keep things down, they may need to get injections of their antiepileptic drugs to keep from having seizures.

### ***When you come for a recheck***

Regular rechecks are essential to successfully treat epilepsy. At the very minimum, your veterinarian will need to evaluate your pet once a year. More commonly, two or more rechecks a year are needed. We can do our best for your pet if you prepare for your appointment. Here are some things you can do to help.

- Hold them off food that morning. If blood tests are performed, they will be more meaningful if the pet has been fasted. If your pet is a toy breed with low blood sugar problems, a diabetic, or has other problems which might make fasting dangerous, consult your veterinarian first.
- Schedule the appointment so we can measure trough blood levels. Sometimes we will see them first thing in the morning and give their medication immediately after the blood is taken. Other times we will schedule them late in the day and get the blood before the evening dose.
- Bring your records. Your veterinarian will need to know how the pet has been doing to decide whether adjustments in medication are necessary.



*Recheck visits are required to monitor the pet's progress*

People often worry about how their pet will live with the disease and how bad the side effects of medication may be. Share with us your story ... Tell us about your life with a successfully controlled epileptic pet in the [CEN Discussion Forum](#).

### **What do you do if your pet has a seizure?**

#### ***DON'T PANIC!***

Most seizures will be very brief. They may seem to go on forever, but the average seizure lasts less than 2 minutes. Looking at a clock and timing approximately how long the seizure lasts will be helpful. By observing exactly what your pet does during the seizure, you may be able to provide your veterinarian or the neurologist with important clues to what is going on, so watch carefully. Make certain the dog is safe, that they won't fall down stairs, bang into a sharp edge on the furniture, get tangled in an electric cord, or otherwise injure themselves. They will NOT SWALLOW THEIR TONGUE. They will frequently chomp their jaws so if you try to pull the tongue out either you or their tongue is likely to be bitten. KEEP YOUR HANDS AWAY FROM THEIR MOUTH.

Your veterinarian may recommend giving diazepam (either rectally or orally) or extra oral phenobarbital if the dog seizes. If giving oral medication, first be sure the dog is awake enough to swallow and aware enough to not bite. Often they will be hungry immediately after a seizure and adding the medicine to a ball of food can be an effective way to give it. If lower blood sugar is suspected as a cause of the seizure, your veterinarian may recommend giving some honey or corn syrup to bring the blood sugar up quickly.

The altered behavior following a seizure ([post-ictal](#) behavior) can often be as disturbing as the seizure itself. Most dogs will appear disoriented and blind for a period up to several hours after the seizure. Usually just leaving the pet alone and ensuring that they won't injure themselves until they get back to reality is the best approach. Sometimes reassuring words and petting can calm them; other times they are oblivious to our

attempts to help. Rarely dogs can become irritable during the post-ictal phase. If your dog is very agitated or irritable, be careful, especially if children are involved, since the dog may snap even if they normally wouldn't do such a thing. Don't attempt to hug or hold them still if they are behaving this way.

### ***When do you seek immediate care?***

If your pet has a seizure that has lasted more than 5-10 minutes without stop, they need to be seen by a veterinarian immediately. Within 30 minutes of continuous seizing, the risk of brain damage skyrockets, and it will take time to get to your veterinarian or the emergency clinic. Don't confuse the post-ictal behavior (blindness, pacing, agitation, etc.) with the seizure itself. The post-ictal behavior can frequently continue for hours. If the post-ictal behavior is prolonged or severe (for example the animal is at risk for hurting themselves or behaving aggressively), it may be worth a trip to the veterinarian even though they aren't actively seizing.

Repeated seizures can also be dangerous. Clusters of seizures have a tendency to progress to continuous seizures (status epilepticus). If your pet has 3 or more seizures in a day, they also need to be seen immediately.

### ***Plan ahead***

If your dog begins to seize, know what you need to do so that both of you are safe.

- Will you need to close a door to a stairway or room that could be hazardous? Move furniture, unplug lamps, or remove items that could fall over?
- Will other pets need to be restrained or shut out of the area? Sometimes other pets will be confused and can act aggressively toward the seizing pet, so it may be best to remove them when a seizure starts.
- If your veterinarian has prescribed rectal diazepam or other emergency-use drugs, do you know where they are and how to administer them even under the stress of a seizure?
- Where is the phone number for your veterinarian and/or the nearest emergency clinic? What is the best route to get there and how long will it take? Don't speed or otherwise violate traffic laws; you won't be able to help your companion if you are in the hospital from an automobile accident.
- If you need to transport a seizing or unconscious dog, how will you do it safely? For large breeds, how will you carry them from the house or yard and load them into the vehicle? Since your pet may seize again or be in the post-ictal disorientation while you're transporting them, both you and your pet will be safest if the pet is in an airline crate.
- It may be a good idea to have a "seizure drill" while everything is calm to be sure things are manageable if a seizure begins. You will be calmer, more confident, and better able to help your pet if you know what to do and where things are.

### ***More questions?***

Talk to your veterinarian. They should be able to answer other questions you may have or point you toward additional sources of information.

*Last updated: 4/19/02*

[http://www.canine-epilepsy.net/basics/basics\\_main.html](http://www.canine-epilepsy.net/basics/basics_main.html)