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Understanding Your Pet's Epilepsy

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 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.

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 further on.

- 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 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. He has a serious disease, but don't let that keep you from enjoying the time you have with him.

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.

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 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?

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 clues to a possible underlying disease and provide the baseline from which to watch for potential side effects of antiepileptic drugs.

Since your veterinarian may not witness one of your pet's seizures, they are very dependent 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 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, 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 tranquilize them in order 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.

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, dog's 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.

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, may be necessary to be able to 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.

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 make up 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 will 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 in canine epilepsy.

Living with an Epileptic Pet

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!

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 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 on 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.

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.

People often worry about how their pet will live with the disease and how bad the side effects of medication may be. By all means, if you have any questions, please call our office. We would be happy to help you in any way we can.

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 him or herself. They will NOT SWALLOW THEIR TONGUE. He or she will frequently chomp the jaws together so if you try to pull the tongue out either you or the tongue is likely to be bitten. KEEP YOUR HANDS AWAY FROM HIS

MOUTH!

Your veterinarian may recommend giving diazepam (either orally or rectally) 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 not to 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 a 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 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 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 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 a 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 to get there? 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 him from the house or yard and load him 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 a carrier or 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. He or she should be able to answer other questions you may have or point you toward additional sources of information.

For further information:

See Handout "Seizures," and "Therapy Options for Epilepsy"