

## Seizure Disorders

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What is a seizure?

The word **seizure**, convulsion, attack, or fit describes a sudden abnormal electrical event in the brain that temporarily interrupts normal brain function. Chaotic electrical activity replaces the normal electrical signals coming from the brain cells.

There are many different diseases known to cause seizures in animals. Anything that can change the function of the neuron within the brain may produce a seizure. Your veterinarian or veterinary neurologist determines the cause of the seizures through a complete physical and neurological examination plus appropriate diagnostic testing.

What causes a seizure?

The cause of seizures is usually classified into two categories; extra-cranial and intra-cranial. Metabolic disorders and toxicities are the two main causes of extra-cranial seizures. Metabolic disorders include hypoxia (low oxygen), hypoglycemia (low blood sugar), hepatoencephalopathy (liver malfunction that allows toxins to build up), hyperlipoproteinemia (specific syndrome primarily seen in schnauzers), electrolyte imbalances (calcium, sodium, and potassium), and hyperthermia/heat stroke. Toxic causes of seizures include lead (uncommon), organophosphates, ethylene glycol (anti-freeze), rodenticides, and snail bait. Extra-cranial causes are usually diagnosed with laboratory tests and history of toxin exposure or ingestion.

Intra-cranial disorders that cause seizures include congenital malformations (hydrocephalus, lissencephaly), degenerative diseases (storage diseases), immune-inflammatory diseases, infectious agents (viral and fungal), cancer (brain tumors), severe trauma, and vascular disorders (strokes). Intra-cranial causes are usually diagnosed by brain imaging and analysis of cerebrospinal fluid.

The word **epilepsy** is defined as a disorder of the nervous system, characterized by recurrent seizures that cause convulsions, unconsciousness, etc. Epilepsy can be caused by structural brain disease like hydrocephalus and brain tumors, metabolic disorders such as low blood sugar or low calcium, or can be idiopathic.

**Idiopathic epilepsy** is diagnosed when the precise cause of the nerve cell malfunction can not be found. This diagnosis is made once all other causes have been eliminated with specific diagnostic tests since there is no test for idiopathic epilepsy itself. Studies have shown idiopathic epilepsy is probably an inherited problem in certain breeds of dogs such as the Beagle, Dachshund, German Shepherd Dog, Keeshond, and Belgian Tervuren. Idiopathic epilepsy occurs in almost all breeds of dogs, although it has not been proven to be inherited in all breeds. Certain breeds of dogs have a high incidence of seizure

disorders but do not have a proven genetic basis yet. These breeds include the Boxer, Cocker Spaniel, Collie, Golden Retriever, Irish Setter, Labrador Retriever, Miniature Schnauzer, Poodle, Saint Bernard, Siberian Husky and Wire Fox Terrier.

### The three phases of seizures

Most seizures occur in three stages. The first part of the seizure, called the 'aura' often is not noticed. Owners who have dealt with seizures in their epileptic pets are often aware of certain changes in their pets' behavior prior to a seizure. The pet often shows signs of apprehension, restlessness, nervousness, or salivation. Some can be clingy while others may act aloof.

The second stage is the 'ictus'. The ictus usually lasts for 1-3 minutes. It often seems longer to an owner. During the seizure, the animal usually collapses on its side and has a series of violent muscle contractions that cause the body to be rigid and the legs to paddle. Loss of consciousness, salivation, involuntary urination and defecation may also occur in more severe seizures. A less common form of milder seizures occurs without loss of consciousness with the animal developing stiffness, uncontrolled trembling and attempting to crawl or move to the owner. There is no standard type of seizure and other variants do occur.

The period immediately following the seizure is the 'postictal' phase. It usually lasts less than an hour but may last many hours or as long as 1-2 days. Some pets are confused, disoriented, restless and temporarily blind during this period. They are usually tired, but typically want to eat and drink.

### What should you do if your dog has a seizure?

Seizures are very frightening and scary to pet owners, especially when it is the first seizure. Owners should take certain steps during a seizure to prevent injury not only to themselves but also to their pets.

- Ensure your pet is on the floor away from objects (corners of coffee tables). Do not allow the pet to fall off furniture or down stairs.

- To prevent choking, make sure that collars or leashes do not get caught on protruding objects.

- Keep your hands away from the mouth! Animals are unconscious during typical seizures. They have no control over their mouth and jaw muscles and may bite anything put in their mouth.

- Dogs can not swallow their tongues despite what you may have heard. Do not attempt to restrain the dog or pull the tongue during a seizure.

-Some pets will vocalize, salivate, urinate or defecate during a seizure. Their limbs may become rigid and they may paddle. These actions are involuntary.

-Most seizures last 1-3 minutes and are not life threatening. If the pet has repeated seizures and fails to regain consciousness between the seizures, or if a single seizure lasts longer than 10 minutes, it is in status epilepticus. This is an emergency and your pet needs to be seen by a veterinarian immediately. If your veterinarian is closed, you should go to the nearest emergency hospital. You can pull your pet onto a blanket and then lift the blanket to get them in the car for transport.

Is there a cure for an epileptic animal?

There is no cure for idiopathic epilepsy. Seizures can be controlled with anticonvulsant drugs in most cases. Unfortunately there are a small number of epileptic dogs in which the seizures can not be controlled. The purpose of treatment is to decrease the frequency, duration and severity of the seizures. Generally less than 1 seizure per month is considered good control. One seizure every 3 months is even better! Treatment is started with one anticonvulsant, but several drugs or a combination of drugs may be tried before a successful treatment is found.

It can take many months to get the seizures under control. Your pet may have seizures during this period. The amount of medication is adjusted depending on body weight, frequency of seizures and the therapeutic blood levels of the anticonvulsant medication. Keeping in close communication with your veterinarian or veterinary neurologist is necessary in getting the seizures under control.

What if it is not idiopathic epilepsy?

Your veterinarian will perform a physical and neurological exam and run the appropriate diagnostic tests to evaluate the cause of the seizures. Your veterinarian may refer you to a veterinary neurologist for additional testing and treatment. Tests that may be recommended include a CBC (complete blood count), chemistry profile (blood test), urinalysis, x-rays of the chest and/or abdomen, blood pressure, abdominal ultrasound, certain infectious disease titers (specific blood tests), and CSF analysis (cerebrospinal fluid analysis). Imaging of the brain can be very important in diagnosing the underlying cause of seizures. Magnetic resonance imaging (MRI) is the best test to evaluate the brain. A computed tomography (CT) scan is no longer the recommended imaging test for the brain now that MRI is available. The advantages of MRI over CT include better visualization of soft tissue (i.e. brain), ability to image in more than 1 plane/direction, and no radiation is used.