

# Seizures (Convulsions, Status Epilepticus) in Dogs

## Basics

### OVERVIEW

- “Seizures” are periods of uncontrolled electrical activity in the brain (also known as “convulsions”); “status epilepticus” is repeated or prolonged seizure activity
- “Epilepsy”—disorder characterized by recurring seizures that originate from the brain
- “Idiopathic epilepsy”—epilepsy of unknown cause; syndrome that involves only epilepsy, with no demonstrable underlying brain lesion or other nervous system signs
- “Symptomatic epilepsy”—epileptic seizures are the result of identifiable, structural brain lesions
- “Probably symptomatic epilepsy”—symptomatic epilepsy is suspected, but a lesion cannot be demonstrated
- Cluster seizures—more than one seizure in 24 hours
- Status epilepticus—continuous seizure activity, or seizures repeated at brief intervals without complete recovery between seizures; status epilepticus can be localized (known as “focal status epilepticus”) or generalized (known as “generalized status epilepticus”)—generalized status epilepticus is a life-threatening medical emergency
- Seizures are classified as “focal” (localized), “generalized,” and “focal with secondary generalization”



### SIGNALMENT/DESCRIPTION OF PET

#### Species

- Dogs

### SIGNS/OBSERVED CHANGES IN THE PET

- Aura—beginning of a seizure; dog is aware or feeling changes associated with the oncoming seizure—behavioral changes may be seen (such as looking frightened, seeking owner's assistance, or hiding); indicates localized (focal) onset of seizure activity
- Seizure—may start with an aura and progress to a generalized seizure; dog lies on its side with symmetrical sustained, repetitive (known as “tonic-clonic”) contractions of leg muscles on both sides of the body; often see salivation/drooling, urination, and/or defecation
- Period following the seizure—disorientation, confusion, aimless pacing, blindness, increased thirst (known as

“polydipsia”), increased appetite (known as “polyphagia”)

- A seizure lasts less than 2 minutes
- Most seizures occur when the dog is resting or sleeping
- In localized (focal) seizures, the dog is conscious, but usually mental status is altered
- Dog may be having seizures, may be normal or may have signs (such as disorientation, confusion) following a seizure at time of presentation to the veterinarian
- Mental status, reflexes, and menace response may be abnormal
- Other signs and physical examination findings vary, based on underlying cause of the seizures and the severity of the seizures

## CAUSES

- Pattern of seizures (such as age at onset of seizure activity, type and frequency of seizures) is the most important factor in determining possible causes

### **Extracranial Cause (Disorder Outside of the Head, Leading to Seizure Activity)**

- Metabolic—low blood glucose or sugar (known as “hypoglycemia”); low levels of calcium in the blood (known as “hypocalcemia”); sudden (acute) kidney failure; nervous system disorder caused by accumulation of ammonia in the system due to inability of the liver to rid the body of ammonia (known as “hepatic encephalopathy”)
- Poisons—metaldehyde (snail bait), pyrethrins, organophosphates, lead, hexachlorophene, chlorinated hydrocarbons, and mycotoxins

### **Intracranial Cause (Disorder Inside of the Head, Leading to Seizure Activity)**

- Gradual deterioration, leading to loss of function (known as “degeneration”) of the brain—disorder of the brain characterized by changes of aging (known as “senile encephalopathy”)
- Anatomic or structural disorder—congenital (present at birth) malformation
- Metabolic disease—storage diseases (inherited metabolic diseases in which harmful levels of materials accumulate in the body's cells and tissues)
- Tumors or cancer—primary tumors (meningioma, gliomas); secondary cancer, due to the spread of the cancer (known as “metastatic cancer”)
- Inflammatory infectious disease—viral diseases (such as canine distemper); fungal diseases; protozoal diseases (such as *Neospora*, *Toxoplasma*); rickettsial diseases (such as ehrlichiosis, Rocky Mountain spotted fever)
- Of unknown cause (so-called “idiopathic disease”) or immune-mediated disease—various diseases characterized by inflammation of the brain, spinal cord and their surrounding membranes (the membranes are known as “meninges”), such as granulomatous meningoencephalitis, eosinophilic meningoencephalomyelitis; pug encephalitis; necrotizing meningoencephalitis of Maltese dogs and Yorkshire terriers
- Trauma
- Blood vessel or circulatory disorders—blood clot or bleeding in the brain (known as a “cerebral vascular accident”)
- Epilepsy of unknown cause (idiopathic epilepsy)
- Probably symptomatic epilepsy—following inflammation of the brain (known as “encephalitis”) or development of scar tissue

## Treatment

### HEALTH CARE

- Outpatient—isolated seizures in an otherwise healthy dog
- Inpatient—cluster seizures (more than one seizure in 24 hours) and status epilepticus (repeated or prolonged seizure activity)
- Constant medical supervision
- An intravenous (IV) catheter will be established to allow for drug and fluid administration
- Blood should be drawn for rapid measurement of blood gases, glucose, calcium, and levels of antiseizure drugs (also known as “anticonvulsants”), if pet has been on anticonvulsants
- Carefully cool the body, if the dog has an elevated body temperature (known as “hyperthermia”)

### SURGERY

- Surgical opening of the skull (known as a “craniotomy”)—surgical removal of tumor or cancer (meningioma or other accessible mass)

## **Medications**

Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive

- Seizure type and frequency determine therapeutic approach

### **CONVULSIVE CLUSTER SEIZURES (MORE THAN ONE SEIZURE IN 24 HOURS) AND STATUS EPILEPTICUS (REPEATED OR PROLONGED SEIZURE ACTIVITY)**

- Treat with medications to control seizures (known as “antiepileptic drugs” or “anticonvulsants”)—diazepam, phenobarbital; choice and method of administration of medication based on status of seizure activity at time of presentation to the animal hospital

### **PERSISTENT SEIZURES**

- Propofol (an anesthetic drug), generally administered at doses below those needed to induce anesthesia

### **OTHER MEDICATIONS**

- Dexamethasone—a steroid to improve fluid buildup in the brain (known as “cerebral edema”) secondary to status epilepticus (repeated or prolonged seizure activity)
- Steroids—for treatment of fluid buildup in the brain (cerebral edema) secondary to severe inflammatory central nervous system disease, even if caused by an infectious agent
- Potassium bromide—used to control seizures; requires a prolonged period to reach therapeutic levels; therefore, it is not indicated in the treatment of convulsive status epilepticus (repeated or prolonged seizure activity)
- Pentobarbital (an anesthetic drug)—for pets that fail to respond to diazepam and phenobarbital; antiepileptic activity of propofol is superior to that of pentobarbital

### **LOCALIZED (FOCAL) STATUS EPILEPTICUS (REPEATED OR PROLONGED SEIZURE ACTIVITY)**

- Identify and treat primary cause
- Medications to control seizures (antiepileptic drugs or anticonvulsants)—diazepam, phenobarbital; effective for localized (focal) and generalized seizures
- Long-term anticonvulsants, if necessary—phenobarbital, levetiracetam, or zonisamide

## **Follow-Up Care**

### **PATIENT MONITORING**

- Inpatients—constant supervision for monitoring of seizure activity

### **POSSIBLE COMPLICATIONS**

- Phenobarbital—liver toxicity after long-term treatment; sudden (acute) low white blood cell count (known as “neutropenia”)—rare side effect, seen in the first few weeks of use; if it occurs, permanently discontinue treatment with phenobarbital (as directed by your pet's veterinarian)
- Continued seizures, despite adequate serum levels of medications to control seizures (antiepileptic drugs or anticonvulsants)
- Permanent nervous system deficits (such as blindness or abnormal behavior) may follow severe status epilepticus (repeated or prolonged seizure activity)
- Generalized status epilepticus (repeated or prolonged seizure activity) may lead to elevated body temperature (known as “hyperthermia”), acid–base and electrolyte imbalances, fluid buildup in the lungs (known as “pulmonary edema”), circulatory collapse, and death

## **EXPECTED COURSE AND PROGNOSIS**

- Epilepsy of unknown cause (idiopathic epilepsy) represents a large proportion of dogs with generalized status epilepticus (repeated or prolonged seizure activity)
- Dogs with inflammation of the brain (encephalitis) that develop generalized status epilepticus have poor outcome
- Eyelid or lip twitching in a heavily sedated pet is a sign of ongoing seizure activity
- Pet may need 7–10 days before returning to normal after status epilepticus (repeated or prolonged seizure activity); vision returns last

## **Key Points**

- Treat cluster seizures (more than one seizure in 24 hours) and generalized status epilepticus (repeated or prolonged seizure activity) early
- Antiepileptic (anticonvulsant) treatment in symptomatic epilepsy may not help until the primary cause is addressed
- Keep a seizure calendar noting date, time, severity, and length of seizures
- Ask your pet's veterinarian for an in-home emergency plan for cluster seizures