

## COMMONLY ASKED QUESTIONS REGARDING EPILEPSY AND ITS TREATMENT

### ***What is epilepsy?***

Epilepsy is an abnormal discharge of nerve cells within the brain that causes complete or partial loss of brain and body function. Often these “seizures” take the form of a grand mal convulsion during which the pet may completely lose consciousness and control of bodily functions. Sometimes “partial seizures” occur resulting in only a portion of the body being affected.

### ***What causes epilepsy?***

Neurons, the cells within the brain that transmit information, function by producing minute electrical signals that are propagated to adjacent neurons in a controlled manner. Epilepsy occurs when a small cluster of neurons, known as a seizure focus, begin to discharge spontaneously and their activity causes adjacent groups of neurons to discharge in synchrony with them. This synchronous process can then spread throughout the brain disrupting normal brain function and resulting in outward signs that we recognize as a convulsion. There are many potential causes for this small cluster of neurons to begin to discharge such as a brain tumor, infection, inflammation, or toxins. If a patient does not have one of these identifiable causes of the seizure, it is termed “idiopathic” epilepsy. Idiopathic epilepsy is thought to be due to a congenitally acquired predisposition for some neurons within the brain to discharge spontaneously with little provocation.

### ***How is idiopathic epilepsy treated?***

If a seizure episode occurs only occasionally (less than once every 2—3 months) and is relatively mild, it may not be necessary to treat with anticonvulsants. If, however, the seizure episodes occur more frequently than once every 2—3 months or if an episode lasts over 2—3 minutes, it may be necessary to treat with anticonvulsant medication.

The most commonly used anticonvulsant in the dog and cat is phenobarbital. Potassium bromide is also commonly used in the dog, less commonly in the cat due to potential pulmonary problems. Many of the other anticonvulsants used to treat humans with epilepsy are either too rapidly metabolized in the dog and cat to be effective or cause signs of toxicity, especially liver toxicity. Some of the newer anticonvulsants used in human medicine show promise in dogs and cats, most notably, levetiracetam (Keppra®) and zonisamide (Zonegran®).

### ***What are the side effects of phenobarbital and/or bromide?***

Phenobarbital, especially when first instituted, can cause signs of drowsiness or sometimes hyperactivity, unsteady gait, increased thirst, or increased appetite. These signs are not seen in all cases and when seen within the first week or two of treatment are not cause for alarm. These signs usually disappear within 10—14 days. However, if the signs persist or are particularly distressing to you or your pet the dosage may need to be altered. The incidence of liver toxicity with long-term use of phenobarbital is reported to be approximately 11%.

Bromide is not metabolized by the liver and therefore has no liver toxicity. It does, however, have

many of the other potential side effects as phenobarbital including sedation, increased appetite, and increased thirst. When used in conjunction with phenobarbital the dosage of one or more of the drugs may need to be reduced. Bromide can cause vomiting in some dogs due to gastric irritation. This is usually overcome by giving medication immediately after a meal. There are anecdotal reports of potassium bromide causing pancreatitis in some dogs. In our experience, the incidence of pancreatitis in dogs receiving bromide appears to be no greater than in the general dog population.

### ***How do we determine the correct dosage of anticonvulsant medication?***

In order to be effective in suppressing seizure activity the dosage of anticonvulsant must be tailored for each animal. Individual dogs may metabolize drugs at different rates resulting in different concentrations in their bloodstream and brain tissue. When anticonvulsant medication is first instituted the dose is based upon a “calculated guess”. However, after a period of 10—14 days in the case of phenobarbital and 6—8 weeks in the case of bromide, the concentration in body tissues begins to level out. After those respective periods, a blood sample should be taken and the anticonvulsant concentration measured. The concentration of phenobarbital should be between 25 and 40 mcg/ml and that of bromide between 100—300 mg/dl. If outside this range, an adjustment will be made. Usually it is necessary to make 2 or 3 such measurements at several week intervals in order to fine-tune the drug dosage.

Phenobarbital: check blood levels at 2 weeks, 2-1/2 months, and then every 6 months thereafter.

Bromide: check at 8 weeks, 6 months, then annually.

As with most long-term treatment regimens, red and white blood cell counts and serum chemistries should be checked every six months in pets receiving phenobarbital and annually in dogs receiving potassium bromide to make certain there are no toxic side effects from the medication.

***What is the best time to take a blood sample for anticonvulsant drug measurement?***

When measuring anticonvulsant levels it is ideal that the sample be taken when the drug is at its lowest level which occurs just prior to receiving the next dose. For instance, if a dog is receiving bromide or phenobarbital on a twice daily basis (every 12 hours) a blood sample should be taken between 10 and 14 hours after the last dose.

***Other points:***

If seizures are not adequately controlled it may be necessary to check anticonvulsant levels more frequently and increase the dosage until the level is at the high end of the therapeutic range.

We prefer to have serum bromide determinations done at our facility. Local veterinary laboratories can do serum phenobarbital determinations.

**Blood samples should be obtained after a 12-hour fast.**

***Can medication keep my pet seizure free?***

The goal is to eliminate seizure activity but that is not always possible. Sometimes seizures cannot be eliminated completely but usually the severity and frequency can be reduced to an acceptable level. Keep in mind that if your pet has idiopathic epilepsy

periodic seizures may be unavoidable. If these seizures are of short duration and occur only occasionally a change in medication may not be necessary. If seizures are not controlled adequately with one anticonvulsant alone then an additional anticonvulsant medication may be added. People often ask about diphenylhydantoin (Dilantin®), valproate (Depakene®), carbamazepine (Tegretol®) and other anticonvulsants commonly used in humans with epilepsy. These medications are occasionally used in dogs but because of the canine ability to rapidly metabolize anticonvulsant drugs it is difficult to achieve therapeutic levels. These drugs are generally not effective and are toxic to the liver at the dosages needed to control seizures in dogs. There are some newer drugs such as levetiracetam and zonisamide that appear to have value when used either alone or in conjunction with bromide or phenobarbital.

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