


# 'TIS THE SEIZIN'

SEIZURE MANAGEMENT 101

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## SEIZURE PATHOGENESIS



- International Veterinary Epilepsy Task Force Consensus - Current understanding of idiopathic epilepsy of genetic or suspected genetic origin in purebred dogs
- Abnormal neuronal activity causing seizures may occur secondary to structural lesion or reflect changes in neurotransmitters and their receptors
- 2 main types of receptors:
  - Glutamate - excitatory
  - GABA - inhibitory

International veterinary epilepsy task force consensus proposal: diagnostic approach to epilepsy in dogs

## OUTLINE

- What are seizures?
- Causes for seizures
  - Idiopathic epilepsy
  - Reactive epilepsy
  - Structural disease
- Medications
  - Keppra, phenobarbital, zonisamide, potassium bromide
  - Loading medications and starting doses
- Emergency seizure management

## SEIZURE CHARACTERISTICS

- Loss of consciousness
- Rhythmic uncontrolled muscle movements
  - Focal motor
  - Complex partial
  - Generalized tonic-clonic
- Autonomic signs
  - Drooling
  - Urinating/defecating
- Length of time of episode & when it occurs
- Clear post-ictal phase
- And there there's cats...

## BUT FIRST, SOME HOSPITAL UPDATES

- Both Dr. Korff and myself work at **VCA Northwest Veterinary Specialists** and we now have 2 full time and 2 part time neurologists (Dr. Karen Kline, Dr. Ann Bilderback)
- Update on cost:
  - MRI brain/spine estimate: \$5000-6000
  - Standard hemilaminectomy: \$10-14,000 (depending on size)
- We have lots of open appointments so please send patients our way or call for questions; we are happy to help!

## CAUSES FOR SEIZURES

**Idiopathic (genetic) epilepsy**

- Between 6 months and 6 years of age
- Normal blood work (and bile acids)
- Normal behavior and interictal exams
- +/- MRI

**Reactive epilepsy**

- Any age
- Toxins
- Endocrine disease
- +/- normal exam

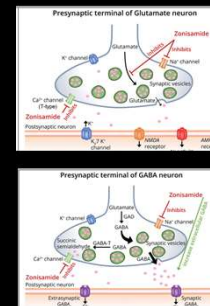
**Structural epilepsy**

- Any age, but more likely > 6
- Typically abnormal exam
- +/- abnormal blood work
- Refer & recommend MRI

# SEIZURE MEDICATIONS

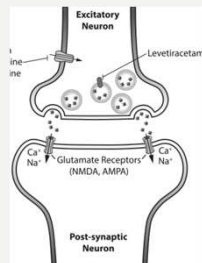
## ZONISAMIDE

- **Mechanism of action:** primarily alters the fast inactivation threshold of voltage-dependent sodium channels to reduce sustained high-frequency repetitive firing of action potentials.
  - also inhibits low-threshold T-type calcium channels in neurons, which may prevent the spread of seizure discharge across cells
- **Starting doses:**
  - Dogs: 5-10 mg/kg po q12h OR 10-15 mg/kg po q12h when on phenobarbital
  - Cats: 5-10 mg/kg po q24h
  - Check blood work (CBC/chem +/- UA) at 2-4 weeks, and then every 6 months thereafter
- **Tend not to recommend compounding this medication as it is variable in its efficacy**
- **Side effects:**
  - Dogs: liver dysfunction, sedation/ataxia, GI signs
  - Cats: anorexia, sedation, renal tubular acidosis



## KEPPRA/LEVETIRACETAM

- **Mechanism of action:** Binds to presynaptic vesicle SV2A glycoprotein
  - inhibits presynaptic calcium channel release
  - reducing neurotransmitter release and acting as a neuromodulator
  - believed to impede impulse conduction across synapses
- **Starting dose:** ~30 mg/kg and up to ~100 mg/kg
  - Following 100 mg/kg, usually see no additional seizure control
  - Increase doses in increments of ~30 mg/kg
- **Both in regular release and XR**
  - With q8h dosing, DO NOT need to be exact
- **Blood work once yearly (just in case)**



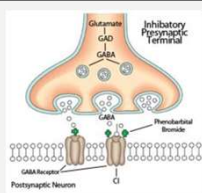
## POTASSIUM BROMIDE

- **Mechanism of action:** primarily mediated through the activation of GABA(A) receptor
  - increase chloride permeation and causes hyperpolarization of neurons
- **VERY LONG HALF-LIFE!**
  - This medication must be loaded: 70 mg/kg po q12h x8 doses
  - Maintenance: 20 mg/kg po q12h OR 40 mg/kg po q24h
  - NOT FOR CATS – fatal pulmonary disease
- **Side effects:**
  - Sedation/ataxia, pancreatitis
  - “bromism”
- **THIS IS A SALT!!!**
  - Consistent diet VERY important
- Use KBroVet only



## PHENOBARBITAL

- **Mechanism of action:** Binds GABA(A) receptors
  - increases the amount of time chloride channels are open, consequently depressing the CNS
- **Starting dose:**
  - 2-4 mg/kg dogs
  - 2-3 mg/kg cats
  - Check blood work (CBC/chem AND pheno level) at 2-4 weeks, and then every 3-6 months thereafter (pending seizure control)
- **Tend not to recommend compounding this medication as it is variable in its efficacy**
  - 4 mg/ml commercially available liquid available
- **Side effects:**
  - Dogs: PU/PD/PP, sedation, ataxia, liver dysfunction, blood dyscrasias, rarely pancreatitis
  - Cats: neutropenia, sedation/ataxia, pseudolymphoma



## “CLUSTER BUSTERS”

- **Oral clonazepam**
  - 0.5-1 mg/kg po q8h for 2 days following a seizure
  - Should give following ONE seizure
- **Intranasal midazolam**
  - 0.5 mg/kg IN during/after seizure
  - More helpful for status patients with seizures > 5 mins
- **Rectal diazepam**
  - 0.5 mg/kg through red rubber catheter
  - Why do this when you can give midazolam in the snoot?????



Intranasal Midazolam versus Rectal Diazepam for the Management of Canine Status Epilepticus: A Multicenter Randomized Parallel-Group Clinical Trial

## EMERGENCIES

- You have MANY options!
- Keppra loading (both in urgent situations or when starting the drug)
  - 60-100 mg/kg IV once followed by 40 mg/kg IV 1-2 hours later
  - Then start maintenance
- Phenobarbital loading – best when starting the drug
  - 16 mg/kg IV split up as you see fit depending on patient sedation and # seizures
  - Can sprinkle in another 4 mg/kg if needed
  - When in doubt, give more
- Midazolam/diazepam
  - 0.5 mg/kg IV or IN
  - 0.3-1 mg/kg/hr CRI if needed
- NO PROPOFOL



## GENERAL SEIZURE MANAGEMENT

Maximize first drug  
before adding more

**THANK YOU!**