| **TABLE 1. MAINTENANCE SEIZURE MEDICATIONS:**[1–3,6,12] | | | | | | |
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| **Drug** | **MOA** | **T1/2** | **TSS** | **Dosage** | **Side Effects** | **Monitoring and Tidbits** |
| Phenobarbital | Prolongs opening of chloride channels to increase responsive to GABA | 24-48 hours | 10-14 days | IV, PO<br>Loading:<br>Dogs 16 mg/kg (divided- I usually do 4 mg/kg every 2-4 hours pending sedation level x 4 doses);<br>Cats 8-12 mg/kg (again divided)<br><br>Maintenance:<br>Dogs 2-3 mg/kg PO q12hrs<br>Cats 1-3 mg/kg PO q12hrs<br><br>*Takes up to 30 minutes for effect IV | Sedation<br><br>PU/PD/PP<br><br>Ataxia (transient)<br><br>Hepatotoxicity (>35 ug/ml)<br><br>Cell dyscrasia (anemia, thrombocytopenia, leukopenia - usually detected in first few months)<br><br>Toxic epidermal necrosis<br><br>Necrotizing hepatitis | Initial bile acids screen before start medication → later helpful to follow up if concern about liver function.<br><br>Phenobarbital level beginning 2-3 weeks after initiation then every 6-12 months thereafter or at time of breakthrough seizure. Recheck 2-3 weeks after any dose change.<br><br>*Therapeutic range: ideally want 20-30(32) ug/ml.*<br><br>Check CBC/Chemistry in 2-3 months after start then q6-12 months.<br><br>2/3 albumin-bound → if low albumin can affect level.<br><br>Body becomes more efficient metabolizing by hepatic cytochrome P450 enzyme system.<br><br>Can decrease T4 and fT4 and increase TSH – need full panel if suspicious of hypothyroid! |
| Potassium Bromide (KBr) | Increases GABA-activated chloride conduction (hyperpolarize neuronal membrane) | 20 days | 120 days | PO<br>(IV = NaBr)<br>Loading: 500 mg/kg → can divide into 100 mg/kg/day (or divided BID x 5 days), then maintenance 20-40 mg/kg PO q24hrs | DO NOT USE IN CATS (1/3 DIE due to idiosyncratic eosinophilic pneumonitis)<br><br>Sedation<br><br>PU/PD/PP<br><br>Ataxia (can persist)<br><br>GI issues (vomiting, gastritis, pancreatitis) | Blood levels at 3 months after starting, then q6-12 months.<br><br>*Therapeutic range: 1-3 mg/ml.*<br><br>Check chemistry panel q6-12 months.<br><br>Does not have permanent way to stay in body…if need to place patient on IV fluids, will reduce/eliminate bromide from body. Renal excretion.<br><br>Expect pseudohyperchloremia on chemistry…if hypochloremic, this would raise concern. |

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| | | | | | Behavior changes<br><br>Asthma in dogs | Need to be consistent with diet – no new treats or foods as change sodium concentration and hence absorption of Bromide.<br><br>If use liquid and placing on food, need to feed in metal bowl as will leach into the plastic! |
| Levetiracetam (Keppra) | Not entirely clear; binds to synaptic vesicle protein (SV2A) in brain associated with Ca flow | 3-6 hours | 24 hours; However, doesn't really reach a baseline like Pheno or KBr | PO, IV, rectally<br><br>"Load" 50-60 mg/kg once<br><br>Maintenance: 20-50 mg/kg PO q8hrs<br><br>Pulse therapy for known cluster seizure dogs: add on therapy at 30-60 mg/kg PO q8hrs for 72 hours following a seizure then discontinue if seizure free. Repeat as needed. | Sedation<br>+/- Ataxia<br><br>Some vomiting reported | CBC/Chemistry/UA q6-12 months as general health screen.<br><br>*Therapeutic range: obtain 2 hours post dose for peak and right before giving next dose for trough (5-40 ug/ml).*<br><br>Great for cases with liver disease.<br><br>If underlying renal disease, may have reduced clearance so be cautious of dosing.<br><br>"Honeymoon effect" possible after a couple of months…may need to adjust dose.<br><br>Have extended release formulations now (XR/ER). Start dose higher: 30-40 mg/kg PO q12hrs. DO NOT SPLIT THESE CAPSULES! Also, warn owners about possible "ghost capsules in feces." |
| Zonisamide | Sulfonamide. Exact mechanism unknown. Blocks Ca and Na channels. Inhibits K-mediated Glutamate release. Weak | 15-30 hours | ~4-5 days | 5-10 mg/kg PO q12hrs (up to 20 mg/kg q12hrs).<br><br>When combined with Pheno, start at 7.5-10 mg/kg PO q12hrs. | Transient sedation<br><br>Ataxia<br><br>Vomiting/diarrhea/anorexia<br><br>KCS (immune mediated) | Metabolized by hepatic microsomal enzymes. Check CBC/Chemistry every 6-12 months. Probably not a bad idea to have initial bile acids screen too.<br><br>Check trough levels 1 week after starting treatment if inclined.<br><br>*Therapeutic range: 10-40 ug/ml.* |

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| | Carbonic anhydrase inhibitor. | | | | Uncommon hepatotoxicity<br><br>Renal tubular acidosis<br><br>Cytopenias possible<br><br>Cats: somnolence, ataxia, vomiting/ diarrhea/anorexia | Use with caution in Dobies or other breeds sensitive to sulfa-drugs.<br><br>Affects thyroid peroxidase → can cause true hypothyroidism (need full panel to diagnose if clinical suspicion)!<br><br>Can help reduce CSF production since carbonic anhydrase inhibitor. |
| Gabapentin | Binds to alpha2-delta subunit of the voltage-gated calcium channels → Inhibits Ca channels reducing release of excitatory neurotransmitters | 2-4 hours | 10-20 hours | 10-30 mg/kg PO q8-12hrs | Sedation<br>+/- Ataxia | Renal elimination; 30-40% hepatic metabolism in dogs. |
| Pregabalin | 3-10X > potency as Gabapentin | 7 hours | ~35 hours | 2-4 mg/kg PO q8-12hours | Sedation<br>+/- Ataxia | |
| **SELECT EMERGENCY MEDICATIONS** | | | | | | |
| Diazepam<br>Midazolam<br><br>Lorazepam | Benzodiazepine. Enhances pre and post synaptic GABA transmission; increases neuronal chloride to hyperpolarize the neuron. | 3 hours | n/a as not really a thing without a CRI! | D/M: 0.5-2 mg/kg IV; can repeat 2-3 times.<br><br>D/M: As a CRI, 0.1-0.5 mg/kg/hr. Once initiated, continue for minimum of 12-24 hours seizure free then do not reduce any faster than 0.1 | Sedation<br>+/- Ataxia<br><br>Reduced consciousness<br><br>Respiratory depression<br><br>Hypotension<br>Increased appetite<br><br>Agitation<br><br>Aggression | Metabolized primarily by liver.<br><br>Binds to plastic (lines and syringes). Need to change out every 24 hours.<br><br>Light sensitive…need to wrap syringe and fluid line all the way to the patient catheter!<br><br>If going to send home emergency supply with owner, must send home in original glass vial for owner to store in a cool, dark place and draw up when needed for use. Stored long-term in a syringe will NOT BE EFFECTIVE! |

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| | | | | mg/kg every 4-6 hours.<br><br>Diazepam 0.5 mg/kg into each nostril.<br><br>Diazepam per rectum 1-2 mg/kg.<br><br>[Mean peak plasma] in < 2 min when given IV; < 15 min given rectally<br><br>Lorazepam 0.2 mg/kg IV or IN | Occasional CNS excitement<br><br>**DO NOT give ORAL diazepam to a cat…can cause hepatic necrosis! | |
| Clorazepate | 10x more potent than Diazepam. | 3-6 hours | n/a as used for pulse therapy | 0.5-2.0 mg/kg PO q8hrs for rescue therapy given for 48-72 hours then discontinued pending seizure free.<br><br>If on Pheno, start at 0.5-1 mg/kg PO q8hrs. | Sedation | *Can build a tolerance over time; really only use for known cluster seizure dogs to try to break the cycle.<br><br>Can alter your Pheno level if on longer term! |