Antiepileptic Medications

Drug	Dose	MOA	Metabolism	Bioavailability	Peak concentration	Half Life	Steady state	Therapeutic range	When to measure levels and monitor bloodwork	Factors that affect absorption	Other factors	Side effects
Phenobarbital	MAINTENANCE Dog: 2.2-4.4 mg/kg PO q12h (can be given IV) Cat:2.2-4.4 mg/kg PO q12h (can be given IV) LOADING: Dog and cat 16-20 mg/kg IV or PO over 24 hours	Barbituate - Increases neuronal responsivity to GABA; prolongs opening of the chloride channel at GABA a receptor Some anti-glutamate effects Inhibits calcium uptake into neurons	hepatic (1/3 goes unchanged in urine)	90% (absorbed within 2 hours)	4-8 hours	32-89 hours (40-90 in dog; 40-50 in cat)	7-20 days (Dog) 8-10 days (Cat)	15-35 mg/dL **(don't go above 35 mg/dL)**	Levels 2 weeks and 6 weeks after starting or dose change and then every 6 months; general health panel every 6 months	low protein diet may eliminate Pb more rapidly; alkalinizing the urine may result in enhanced renal elimination; drug is a potent inducer of hepatic enzyme activity and can induce toxicity more often at high doses or when other potential hepatotoxic drugs are used	Collect blood in a non serum separator tube; hypertriglyceridemia may falsely elevate Pb measurements; will artifically lower T4 and increase TSH	Common: Sedation (especially with secondary brain disease), elevation in liver enzmyes Rare: hepatotoxicity, cytopenias, superficial necrolytic dermatitis, changes in thyroid tests, facial pruritis (in cats)
Levetriacetam	MAINTAINENCE: 20-40 mg/kg PO q8h (can be given IV, IM, and SQ); good for use in emergency situation; LOADING: 20-60 mg/kg every 2-8 hours	Binds to synaptic vesicle protein A (SVA2) involved in modulation of NT release, reuptake and recycling	Kidney (1/3 via glomerular filtration)	100%	2 hours	2.3-4 hours (dog); 3 hours (cat)	17 hours	5-45 ug/mL (human) (seldom performed due to expense and high safety margin)	Levels not recommended; general health panel every 6 months	Phenobaribal lowers the half life to 1.5 hours, therefore use higher dose or increased frequency in patients already on phenobarbital	Neuroprotective properties that may decrease seizure induced brain damage; "anti-kindling effect"; Possible "honeymoon effect"; brivaracetam and seletracetam are being evaluted in human medicine	Rare: Sedation; at doses >400 mg/kg/d see ataxia, vomiting, salivation, and restlessness
Levetriacetam Extended Release	20-30mg/kg PO q12h **(cannot break tablet)**; some patients require q8h dosing	Binds to synaptic vesicle protein A (SVA2) involved in modulation of NT release, reuptake and recycling	Kidney (1/3 via glomerular filtration)	100%	3-7 hours	5 hours (dog)	28 hours	5-45 ug/mL (human) (seldom performed due to expense and high safety margin)	Levels not recommended; general health panel every 6 months	Phenobaribal lowers the half life to 1.5 hours, therefore use higher dose in patients already on phenobarbital	Neuroprotective properties that may decrease seizure induced brain damage; "anti-kindling effect"; Possible "honeymoon effect"; brivaracetam and seletracetam are being evaluted in human medicine	Rare: Sedation; at doses >400 mg/kg/d see ataxia, vomiting, salivation, restlessness and "ghost capsules" (patient's feces may contain part of the outer capsule)
Bromide	MAINTENANCE: 20-40 mg/kg PO q24h; DO NOT USE IN CATS; LOADING: 100mg/kg/d PO for 5 days	Salt - Bromide ion thought to hyperpolarize neuronal membranes after traversing neuronal chloride channels (competes with chloride), thereby raising seizure threshold; primarily at GABA receptors	minimal, not protein bound; excretion via kidneys	60-100%	-	15-45 days	80-120 days	100-300 mg/dL	Levels at 4-6 weeks and then 12 weeks after starting or dose change and then every 6 months; general health panel every 6 months	IVF with non physiologic sodium content, Na in diet (increased intake, increases the rate of elimination)	monitor levels q 6mo to prevent toxicity; pseudo-hypercholermia on laboratory testing	Common: Nausea (give with food and BID), PU, PD, polyphagia, bromidism, pancreatitis, megaesophagus, pneumonitis in cats; Rare: behavioral changes (i.e. aggression), coughing
Zonisamide	5-10 mg/kg PO q12h (dog); 10-20mg/kg PO q24h (cat)	Sulfonamide-like: blockade of T-type Ca+ channels and voltage gated Na+ channels, enhancement of GABA, modulates other NTs; may provide neuroprotective effects	hepatic metabolism via microsomal enzmyes (10% excreted unchanged in kidneys)	68%	3-4 hours	15-17 h (dog); 34.5h (cat)	4-7 days	10-40 ug/mL (human); check trough level	Levels not typically performed, though ACVIM consensus statement recommends level at 2 weeks after starting and then every 6 months; general health panel every 6 months	phenobarbital decreases serum concentration (start at 10mg/kg PO q12h if patient is on phenobarbital), phenobarbital shortens the half life and less bioavailable	Do not use in Dobermans or other patients sensitive to sulfonamides	Ataxia, lethargy, KCS, inappetance, idiosyncractic hepatotoxicity
Gabapentin	20-30 mg/kg PO q8h	blockade and preventing synaptogenesis of the alpha-2-delta subunit of the voltage gated T-type calcium channel	30-40% metabolized by liver and 60-70% excreted unchanged in the kidney	80%	1 hour	3-4 hours	16.5-22 h	4-16 mg/mL (seldom performed due to expense and high safety margin)	Levels not recommended; general health panel every 6 months	None	Good analgesic, not typically effective as an anticonvulsant; no good studies in cats	Ataxia and sedation
Pregabalin	2-4 mg/kg PO q8h; may be possible to dose q12h; start at low end of dose and go up	blockade and preventing synaptogenesis of the alpha-2-delta subunit of the voltage gated T-type calcium channel; decreases glutamate, NE and substance P	Unknown, likely same to gabapentin	-	6-7 hours	1.5 hours	33-40 h	2.8-8.2 ug/mL (seldom performed due to expense and high safety margin)	Levels not recommended; general health panel every 6 months	None	Good analgesic medication; possible anxiolytic	Sedation (usually transient)
Felbamate	15-20 mg/kg PO q8h (can be increased in 15 mg/kg increments q2 weeks up to 70mg/kg). No information about dosing in cats	enhances sodium channel inactivation, enhances GABA, and reduces glutamate excitation (via NMDA receptors)	30% hepatic metabolism; Excreted unchanged in the urine	-	3-7 hours	4-8 hours	20-30 h	20-100 ug/mL (seldom performed due to expense and high safety margin)	Levels not recommended; general health panel every 6 months	Synergistic hepatotoxicity, especially if on other potentially hepatotoxic drugs, so monitor liver values/CBC q6 month; can increase Pb levels (due to P450)	EXPENSIVE; may offer some protection of neurons from ischemic or hypoxic damage; toxic dose is 300 mg/kg/day; Flurofelbamate is being investigated in people and may be a less toxic option in the future	At high doses: nervousness, hyperexcitability, and decreased appetite; Rare: blood dyscrasias, KCS, hepatotoxicity, generalized tremors (in small breed dogs)
Topiramate	2-10 mg/kg PO 8-12h. Start at low dose and titrate up as needed. No information about dosing in cats	Sulphamate-substituted monosaccaride. Enhaces GABAergic activity and inhibits voltage-gated sodium and calcium channels	Renal		30 minutes - 4 hours	2-3.8 h	11-20 hours	-	Levels not recommended; general health panel every 6 months	None	May be more effective as a TID dose, due to short half life; May be helpful as an add-on for refractory epileptics; exteneded release version available in human medicine	Sedation, ataxia, weight loss
Diazepam	0.5 mg/kg IV or IN; 1 mg/kg rectally	Benzodiazepam enhance the activity of GABA	in liver to several metabolites, glucuronic conjugation, highly protein bound	90% intravenously; 50% rectally; 80% intranasally	30 minutes - 2 hours	2.5-3.2	14-16 h	-	N/A - ER use only	None	Can develop tolerance in dogs	Idiosyncratic hepatopathy in cats; contradictory CNS excitement
Lorazepram	0.2 mg/kg IV (dog only)	Benzodiazepam enhance the activity of GABA	hepatic	-	-	short	-	-	N/A - ER use only	None	May be more effective than diazepam	Sedation
Midazolam	0.066-0.22 mg/kg IV, IN, or IM	Benzodiazepam enhance the activity of GABA	hepatic, safer than diazepam	-	-	short	-	-	N/A - ER use only	None	May be more effective than diazepam	Sedation
Chlorazepate	initially 0.5-1 mg/kg (can go up to 2-4 mg/kg) PO q12h	Benzodiazepam enhance the activity of GABA	Hepatic	-	-	3-6 hours	16.5-33 h	-	Levels not recommended; general health panel every 3-6 months	Concurrent phenobarbital; drug may increase Pb concentration after 1 month	patients may develop a tolerance; possible use for at home use for cluster patients	potential for hepatotoxicity
Clonazepam	0.5 mg/kg PO q12h	Benzodiazepam enhance the activity of GABA	Hepatic	-	-	-	-	-	Levels not recommended; general health panel every 3-6 months	-	Can be helpful in refractory seizures; mainly used in hypertonicity diseases	Hepatotoxicity if used for more than a few months

Anticonvulsants NOT recommended in dogs and cats, due to toxicity and/or short half life:
Primidone, phenytoin (Dilantin), carbamazepine, valproic acid, ethosuximide, vigabatrin, lamotrigine, oxcarbazepine, triagabine
Anticonvulsants available in the EU for dogs and cats:
Pexion (Imepitoin)