

## AED

(DOC: drug of choice – G: generalized – P: Partial – A: absence – M: Myoclonic- Green check mark: choice – Red cross: not effective)

	MOA	Indications				Side effects Black box warnings marked in Red	Metabolism /Excretion	Target Sr Level	Pregnancy
		P	G	A	M				
<b>Carbamazepine</b>	Na Channel blocker	√	√			Neuro: Nystagmus, dizziness, blurred vision Blood: BM suppression, <b>aplastic anemia</b> Endo: hyponatremia, decreased osmolality Teratogenic: spina bifida <b>SJS/TEN specially in Asians with HLA-B*1502</b>	Hepatic	4-12 total 1-3 free	D
<b>Ethosuxamide</b>	T-type Ca channel blocker			√		Neuro: drowsiness, headache GI: N,V, tongue swelling Blood: anemia, leukopenia	Hepatic	40-100	D
<b>Valproate</b>	Na Channel blocker Inhibits GABA-transaminase NMDA antagonist Histone deacetylase inhibitor	√	√	√	√	Neuro: Tremors GI: N,V,anorexia, hyperammonemia, <b>pancreatitis</b> , <b>Hepatotoxicity in kids &lt; 2 years, specially kids with Alpers syndrome (1/50,000)</b> Blood: Thrombocytopenia Weight gain, PCOS, Reversible hair loss <b>Teratogenic: spina bifida in 1%, women must use OCP</b>	Hepatic	50 (trough)- 150 (peak)	X
<b>Phenytoin</b>	Na Channel blocker	√	√		X	Neuro: Ataxia, nystagmus, vertigo, tremors CVS: <b>hypotension &amp; arrhythmia with IV infusion</b> GI: Gingival hyperplasia Blood: Anemia, aplastic anemia, Hemorrhagic disease in newborns Teratogenic: fetal hydantoin synd, cleft lip SJS/TEN	Hepatic	Total: 10-20 Free: 1-2	D
<b>Phenobarbital</b>	GABA agonist	√	√		√	Neuro: sedation, paradoxical hyperactivity in some children Amelogenesis Imperfecta (abnormal teeth enamel) Blood: megaloblastic anemia, Vit K dependent coagulopathy	Hepatic	10-40	D
<b>Gabapentin</b>	Modulates GAD enzyme, ↑ GABA activity (seizure control) Binds to α2δ subunit of VG Ca Channel (pain control)	√				DRESS – Angioedema - Sedation In Kids: hostility – hyperactivity Elevated CPK, rhabdomyolysis (rare)	Renal		C
<b>Lamotrigine</b>	VG Na Channel blocker	√	√		?	<b>SJS/TEN in 0.8%</b> – DRESS – rare cases of NMS	Hepatic	2-15	D
<b>Topiramate</b>	VG Na Channel blocker ↑ GABA-A Rc activity ↓ AMPA Rc (glutamate Rc) Carbonic anhydrase inhibitor	√	√		√	Naming & cognitive problems Kidney stones (1.5% annual risk) Paresthesia, Weight loss, Hypohydrosis and hyperthermia in kids exercising in hot weather	Renal (70% secreted unchanged in urine)	5-20	D
<b>Levetiracetam</b>	Binds to SV2A presynaptic ptn decreasing neurotransmitter release	√	√		√	Agression/irritability in kids Irritability in adults	Renal	10-50	C

<b>Brivacetam (Briviact)</b>	20 times more affinity for SV2A than levetiracetam	√		Sedation – Drowsiness	Renal		C	
<b>Oxcarbamazepine</b>	Na Channel blocker	√	√	Neuro: Nystagmus, dizziness, blurred vision Blood: BM suppression, aplastic anemia Endo: hyponatremia (more than CBZ), osteopenia Teratogenic: spina bifida SJS/TEN (not black box)	Hepatic	3-35	C	
<b>Zonisamide</b>	VG Na Channel blocker T-type Ca channel blocker Carbonic anhydrase inhibitor	√	√	√	Neuro: Sedation – Dizziness – Ataxia – Impaired Memory/ concentration Kidney stones (1.5% annual risk), hypohydrosis/hyperthermia Acidosis (hyperchloremic non-anion gap) Sulfa allergy – SJS – DRESS	Renal (60%) Hepatic	10-40	D
<b>Lacosamide</b>	Prolongs inactivation of Na Ch Inhibits neuronal growth in chronic epilepsy by Inhibiting CRMP-2 (the collapsing response mediator protein 2)	√			Neuro: Ataxia/Dizziness Cardio: PR interval prolongation, In DM patients: syncope, atrial fibrillation DRESS	Renal	< 10	C
<b>Clobazam (Onfi)</b>	Potential GABA activity	LGS - adjunct for Pnt > 2 yrs			Neuro: Sedation (avoid opioids/CNS depressants) SJS/TEN	Hepatic	30-300 ng	C
<b>Perampanel (Fycompa)</b>	AMPA antagonist	√	√		Neuro: <b>Aggression, Homicidal Ideation</b> Dizziness, vertigo	Hepatic		C
<b>Eslicarbazepine (Aptiom)</b>	Na Channel blocker	√			Similar to oxcarbazepine	Hepatic		C
<b>Ezogabine (Potiga)</b> <b>Discontinued 06/2017</b>	Neuronal K channel opener (KCNQ)	Partial, in refractory Pnt > 18 years			Neuro: <b>Vision loss &amp; Retinal abnormalities (retinal pigment dystrophies) in 30%</b> Grey blue skin discoloration QT prolongation	Hepatic		C
<b>Tiagabine (Gabitril)</b>	GABA reuptake inhibitor	Partial, adjunctive for Pnt > 12 years			Seizures/Status epilepticus with overdose Cognitive symptoms with increased spike/wave discharges in EEG of 6% of patients (? NCSE)	Hepatic		C
<b>Vigabatrin (Sabril)</b>	Irreversible inhibition of GABA transaminase	Infantile Spasm			Neuro: <b>Vision loss (concentric contraction of visual field) in 30%</b> Neuropathy in adults Neurotoxicity: T2/DWI changes in BG in MRI of kids with IS, intra-myelinic edema (IME) with separation of myelin in animals.	Renal	< 235 ng	D
<b>Felbamate</b>	NMDA antagonist VG Na Channel blocker	Adjunctive for refractory Sz			<b>Hepatotoxicity</b> <b>Aplastic anemia 1:5000</b>	Hepatic	30-60 mic	C
<b>Rufinamide (Banzel)</b>	Prolongs inactivation of VG Na Channel	LGS			Neuro: Ataxia/Dizziness <b>Shortens QTc interval (caution in familial short QT syndrome)</b>	Hepatic carboxylase		C

**Common side effects to all AED:** Suicidal ideation (Odds Ratio 1.8), sedation

DRESS: Drug reaction with eosinophilia and systemic symptoms (fever, rash, lymphadenopathy, +/- hepatitis/nephritis/myositis)

SJS/TEN: Steven Johnson syndrome / Toxic epidermal necrolysis

Metabolic acidosis symptoms: hyperventilation, fatigue, anorexia, kidney stones, cardiac arrhythmia, osteomalacia/rickets, osteoporosis