

Comparative Table of Antiepileptic Drugs

Drug	Generation	Pharmacokinetics	Mechanism of Action	Therapeutic Uses	Side Effects	Notes / Interactions
Phenytoin / Fosphenytoin	1st generation	Complete oral absorption, crosses BBB & placenta, 90% protein bound, T _{1/2} 12–36 h, hepatic metabolism, saturable kinetics. Fosphenytoin is water-soluble IV/IM prodrug.	Blocks voltage-gated Na ⁺ channels; at high dose blocks Ca ²⁺ channels; interferes with neurotransmitter release.	Focal seizures, status epilepticus (fosphenytoin), ventricular arrhythmias.	Nystagmus, diplopia, ataxia, gingival hyperplasia, hirsutism, osteomalacia, megaloblastic anemia, teratogenicity.	Enzyme inducer; requires serum monitoring, folate & vitamin D.
Carbamazepine	1st generation	Well absorbed orally, crosses placenta, protein bound, hepatic enzyme inducer with auto-induction.	Blocks Na ⁺ channels reducing abnormal impulse propagation.	Focal seizures, trigeminal neuralgia, diabetes insipidus.	CNS toxicity, liver dysfunction, aplastic anemia, agranulocytosis, teratogenicity, hyponatremia.	Not used in absence seizures.
Oxcarbazepine	2nd generation	Prodrug converted to active MHD metabolite, less enzyme induction, no auto-induction.	Blocks Na ⁺ channels.	Focal seizures.	Less CNS toxicity, more hyponatremia.	No hepatic failure or bone marrow toxicity reported.
Valproic acid / Divalproex	1st generation	Well absorbed orally, 90% protein bound, hepatic metabolism to toxic metabolites.	Increases GABA, blocks Na ⁺ and T-type Ca ²⁺ channels.	Generalized, focal, absence, febrile, myoclonic seizures; migraine prophylaxis.	Hepatotoxicity, alopecia, GI upset, teratogenicity.	Inhibits metabolism of phenytoin, phenobarbitone, carbamazepine.
Ethosuximide	1st generation	Well absorbed orally, not protein bound, 75% metabolized.	Blocks T-type Ca ²⁺ channels.	Absence seizures (DOC).	GI upset, skin rash, urticaria.	Least toxic antiepileptic.

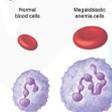
NYSTAGMUS



Hirsutism

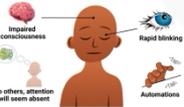


Facial hair



Absence Seizures

Common symptoms



Epidemiology

• Most common in children 5–8 years old
• Girls > boys

Clinical

• Brief (< 10 seconds), sudden impaired consciousness
• Staring, blinking
• May occur in clusters
• No aura
• No postictal period

Diagnosis

• EEG: 3 Hz spike-and-wave discharges
• Hyperventilation for 3–5 min can precipitate the seizures

Treatment

• Ethosuximide
• Valproic acid

Levetiracetam and brivaracetam

- MOA: Modifies the release of glutamate and GABA by binding to the synaptic vesicle protein (SV2A)
- Used in: broad spectrum antiepileptic used in all types of epilepsy except status
- Side effects: dizziness & sleep disturbances, behavioral changes

Felbamate

- MOA: It blocks Na⁺ & Ca²⁺ channels & competes with glycine cofactor at NMDA receptors.
- Side effects: liver and bone marrow toxicities, so it is reserved for use in refractory epilepsy.

Lamotrigine	Topiramate	Zonisamide (Sulfa)
<p>MOA: blocks Na & Ca⁺⁺ channels.</p> <p>used in all types of epilepsy except status epileptics</p> <p>Side effects dizziness, headache & ataxia, Stevens Johnson syndrome</p>	<p>MOA: blocks Na & Ca⁺⁺ channels.</p> <p>Bind glutamate receptor</p> <p>Used in: focal, generalized epilepsy and absence seizures</p> <p>Side effects: impaired concentration, diplopia, weight loss & kidney stones</p>	<p>MOA: Blocks Na⁺ & Ca⁺⁺ channels.</p> <p>Used in: focal, generalized epilepsy and absence seizures</p> <p>Side effect: kidney stones and oligohidrosis.</p>

Gabapentin	Pregabalin	Vigabatrine	Tiagabine
<p>MOA: Enhance release of GABA. They interfere with voltage-dependent Ca⁺⁺ channels</p> <p>Uses: Migraine and neuropathic pain (post-herpetic neuralgia and diabetic neuropathy). Approved as adjunct therapy for focal convulsions</p> <p>Side effects: dizziness, headache & ataxia</p>	<p>MOA: They interfere with voltage-dependent Ca⁺⁺ channels inhibit excitatory transmitter release</p> <p>Used in: focal seizures</p> <p>Side effects: dizziness, headache & ataxia.</p>	<p>MOA: It is an irreversible inhibitor of GABA transaminase, increasing the concentration of GABA.</p> <p>Used in grand mal and focal seizures(refractory)</p> <p>Side effects: sedation, dizziness & behavioral changes, irreversible <u>v</u>ision affection</p>	<p>MOA: It blocks GABA uptake (Transporter) into presynaptic neurons.</p> <p>Used in: focal seizures</p> <p>Side effect: dizziness & GI upset.</p>

AED	Pregnancy Safety	Main Risk
Valproic acid	 Avoid	Neural tube defects, cognitive impairment
Carbamazepine	 Moderate	NTDs
Phenytoin	 Moderate	Fetal hydantoin syndrome
Phenobarbital	 Moderate	Vitamin K deficiency bleeding
Lamotrigine	 Safe	Low risk cleft palate
Levetiracetam	 Very safe	Minimal

Seizure Type	Effective Drugs
Partial—simple or complex	Valproic acid, phenytoin, carbamazepine, lamotrigine
General—tonic-clonic	Valproic acid, phenytoin, carbamazepine, lamotrigine
General—absence	Ethosuximide, valproic acid
Status epilepticus	Lorazepam, diazepam, phenytoin, or fosphenytoin*

**Coming
Pills
Lead
Victory**

**Eyes
Vanish**

**Benzos
Protect
Fast**