

Pharmacology of Antiseizure Drugs

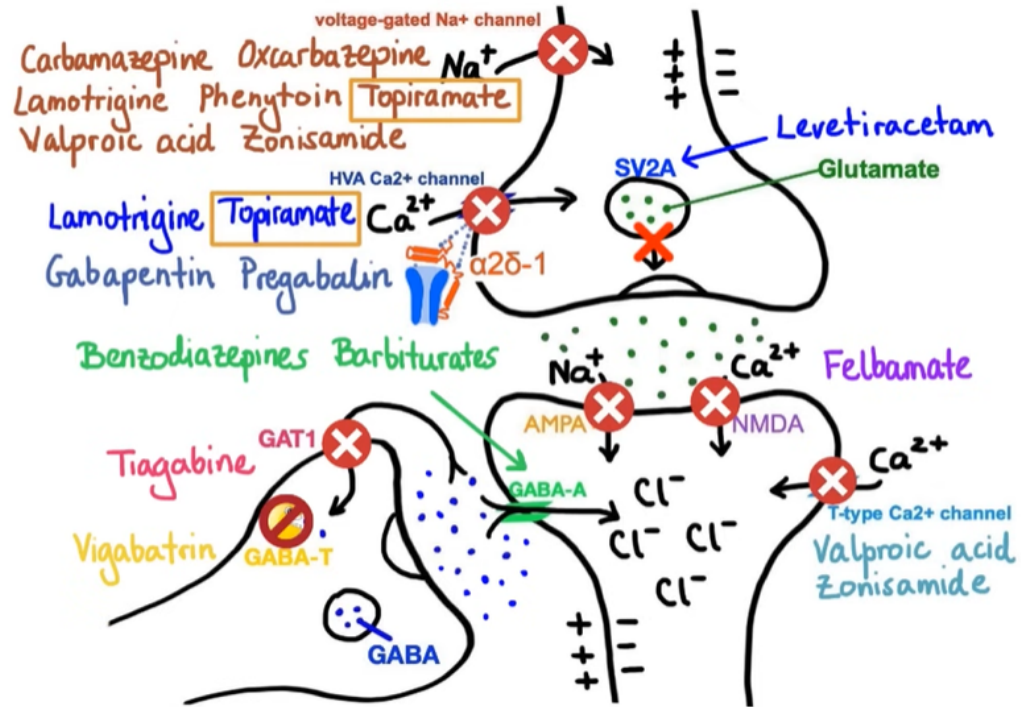
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Introduction

- Antiseizure drugs (ASDs) are used to prevent seizures, while hypnotics are used to induce sleep.
- Understanding their mechanisms, clinical applications, and side effects is crucial for safe and effective treatment.





Classification of Antiseizure Drugs


- Sodium Channel Blockers: Phenytoin, Carbamazepine, Lamotrigine, Lacosamide
- Calcium Channel Blockers: Ethosuximide, Gabapentin, Pregabalin
- GABAergic Enhancers: Benzodiazepines (Diazepam, Lorazepam), Barbiturates (Phenobarbital), Vigabatrin
- Mixed-Mechanism Drugs: Valproate, Levetiracetam, Topiramate, Zonisamide
- SV2A Modulators: Levetiracetam, Brivaracetam
- AMPA Receptor Inhibitors: Perampanel



Mechanism of Action - Antiseizure Drugs

- Sodium Channel Blockers: Reduce repetitive neuronal firing, stabilizing hyperexcitable neurons
- Calcium Channel Blockers: Inhibit T-type calcium currents (important in absence seizures)
- GABAergic Enhancers: Increase GABA activity, enhancing neuronal inhibition
- SV2A Modulators: Modulate synaptic vesicle protein 2A, reducing neurotransmitter release
- AMPA Receptor Inhibitors: Reduce excitatory glutamate neurotransmission

Clinical Uses of Antiseizure Drugs

- Focal Seizures: Carbamazepine, Lamotrigine, Levetiracetam
- Generalized Tonic-Clonic Seizures: Valproate, Phenytoin, Levetiracetam
- Absence Seizures: Ethosuximide, Valproate
- Status Epilepticus: Benzodiazepines (Lorazepam, Diazepam)
- Neuropathic Pain: Gabapentin, Pregabalin 
- Migraine Prophylaxis: Valproate, Topiramate

Adverse Effects of Antiseizure

Drugs

- Phenytoin: Gingival hyperplasia, ataxia, teratogenic effects
- Carbamazepine: Hyponatremia, agranulocytosis
- Valproate: Hepatotoxicity, teratogenicity (neural tube defects)
- Topiramate: Cognitive impairment, kidney stones
- Levetiracetam: Mood disturbances, aggression
- Ethosuximide: GI upset, fatigue

Adverse Effects & Drug Interactions

- Antiseizure Drugs: Sedation, hepatotoxicity, teratogenicity (Valproate, Phenytoin)
- Drug Interactions: CYP450 inducers (Carbamazepine, Phenytoin), increased sedation with alcohol



Latest Research and Future Directions

- Novel antiseizure drugs targeting specific ion channels
- Gene therapy for epilepsy



THANK YOU

