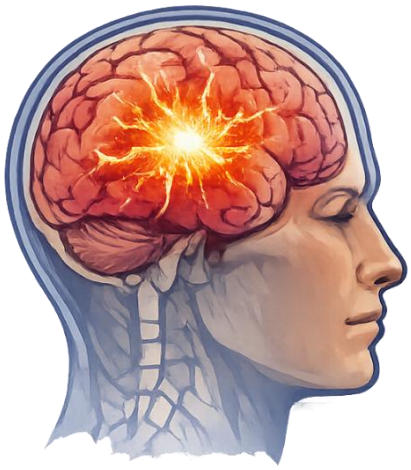
Nervous system

Epilepsy Disease (Pharmacotherapeutics)

What is Epilepsy?

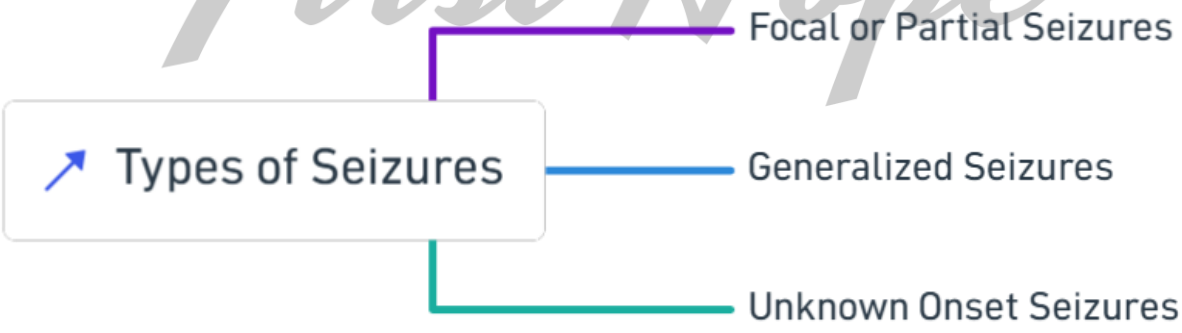
- Epilepsy is a **chronic neurological disorder** characterized by recurrent, unprovoked seizures.



- A seizure is caused by abnormal, excessive electrical activity in the brain.
- It can affect people of all ages and may have different causes.

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Types of Seizures (Important for Drug Choice)



1. **Focal (Partial) Seizures**
   - Start in one part of the brain.
   - May or may not affect consciousness.
2. **Generalized Seizures**
   - Affect both sides of the brain.
   - **Types include:**
     - Tonic-clonic (convulsions)
     - Absence (brief staring spells)
     - Myoclonic (sudden jerks)
3. **Unknown onset seizures**

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- When the origin is unclear.

Pathophysiology (Why seizures occur)

- **Imbalance between:**
  - **Excitatory neurotransmission (glutamate)** → increases neuronal firing.
  - **Inhibitory neurotransmission (GABA)** → suppresses neuronal firing.
- **Epilepsy occurs when:**
  - Excess excitation OR
  - Reduced inhibition
- This leads to synchronized firing of neurons → seizure activity.

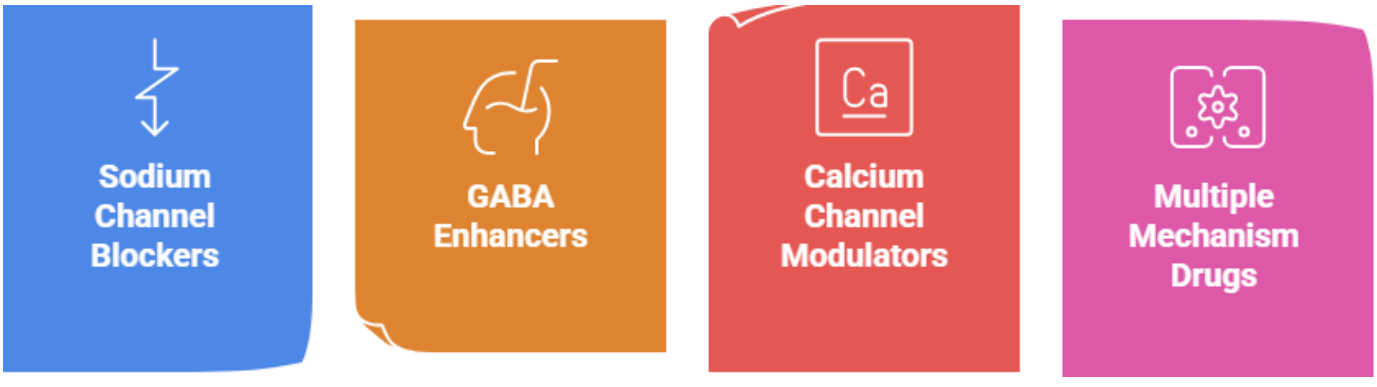
Goals of Pharmacotherapy

- Completely stop seizures (seizure freedom)
- Minimize drug side effects
- Improve quality of life
- Avoid drug interactions

Mechanism of Seizures (Simplified)

- **Normal brain = balance between:**
  - Excitation (glutamate)
  - Inhibition (GABA)
- **In epilepsy:** Too much excitement OR too little inhibition → seizures

Classes of Antiepileptic Drugs (AEDs) & Mechanism



1. Sodium Channel Blockers

- Reduce rapid firing of neurons
- **Drugs:**
  - Phenytoin
  - Carbamazepine

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- Lamotrigine

➢ **Use:**

- Focal seizures
- Tonic-clonic seizures

2. GABA Enhancers (Increase Inhibition)

➢ Increase calming effect in brain

➢ **Drugs:**

- Diazepam
- Phenobarbital
- Valproate

➢ **Use:** Broad-spectrum (many seizure types)

3. Calcium Channel Modulators

➢ Especially effective in absence seizures

➢ **Drugs:** Ethosuximide

➢ **Use:** Absence seizures (drug of choice)

4. Multiple Mechanism Drugs

➢ Affect several pathways

➢ **Drugs:**

- Valproate
- Topiramate
- Levetiracetam

Drug Selection (Very Important Concept)

Based on:

➢ Type of seizure

➢ Age

➢ Pregnancy status

➢ Comorbid conditions

Examples:

➢ Absence seizure → Ethosuximide

➢ Focal seizure → Carbamazepine

➢ Generalized seizure → Valproate

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Adverse Effects of AEDs

Common:

- Drowsiness
- Dizziness
- Fatigue

Serious:

- Liver toxicity (Valproate)
- Skin rash (Stevens-Johnson syndrome with Lamotrigine)
- Gum hypertrophy (Phenytoin)

Monitoring Therapy

Clinical:

- Seizure frequency
- Severity

Laboratory:

- Drug levels (Phenytoin, Valproate)
- Liver function tests

Patient-specific factors:

- Age, pregnancy, comorbidities

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Special Considerations

Pregnancy:

- Some AEDs are teratogenic (e.g., Valproate)

Drug interactions:

- Many AEDs affect liver enzymes

Compliance:

- Missing doses can trigger seizures

Parkinson's Disease (Pharmacotherapeutics)

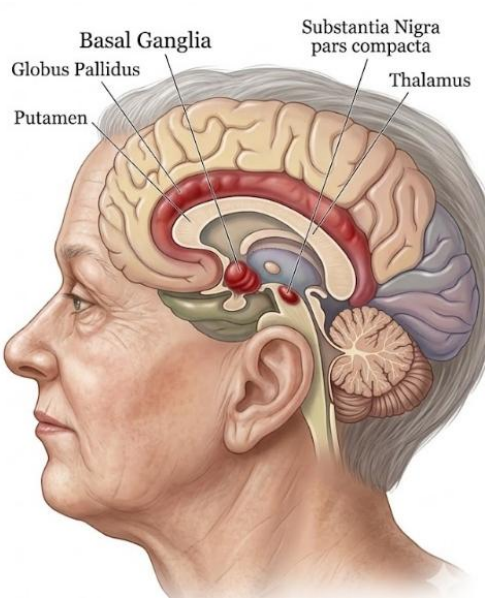
What is Parkinson's Disease?

- A **progressive neurodegenerative disorder**
- Caused by loss of dopamine-producing neurons in the brain (substantia nigra)

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- Leads to movement problems





Key Symptoms (Remember TRAP)

A. Motor Symptoms:

- Tremor (resting tremor)
- Rigidity (muscle stiffness)
- Bradykinesia (slow movement)
- Postural instability

B. Non-motor Symptoms:

- Depression
- Sleep disturbances
- Cognitive impairment

Pathophysiology (Easy Understanding)

Normal:

- Dopamine (inhibitory) balances acetylcholine (excitatory)

In Parkinson's:

- ↓ Dopamine → ↑ Relative acetylcholine activity

Result:

- Motor symptoms appear

Goals of Treatment

- Increase dopamine levels OR mimic dopamine
- Reduce symptoms
- Improve mobility and daily functioning
- Delay disease progression (not fully possible)

Drug Classes & Mechanisms

1. Levodopa + Carbidopa (Gold Standard)

- Levodopa → converted to dopamine in brain.
- Carbidopa → prevents peripheral breakdown.
- **Benefits:** Most effective symptom control.
- **Problems:** Long-term use → fluctuations, dyskinesia (involuntary movements).

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