PHARM.D • YEAR 4

Advanced Pharmacotherapeutics

CHAPTER 3

# Nervous System

PPT CHAPTER COVER

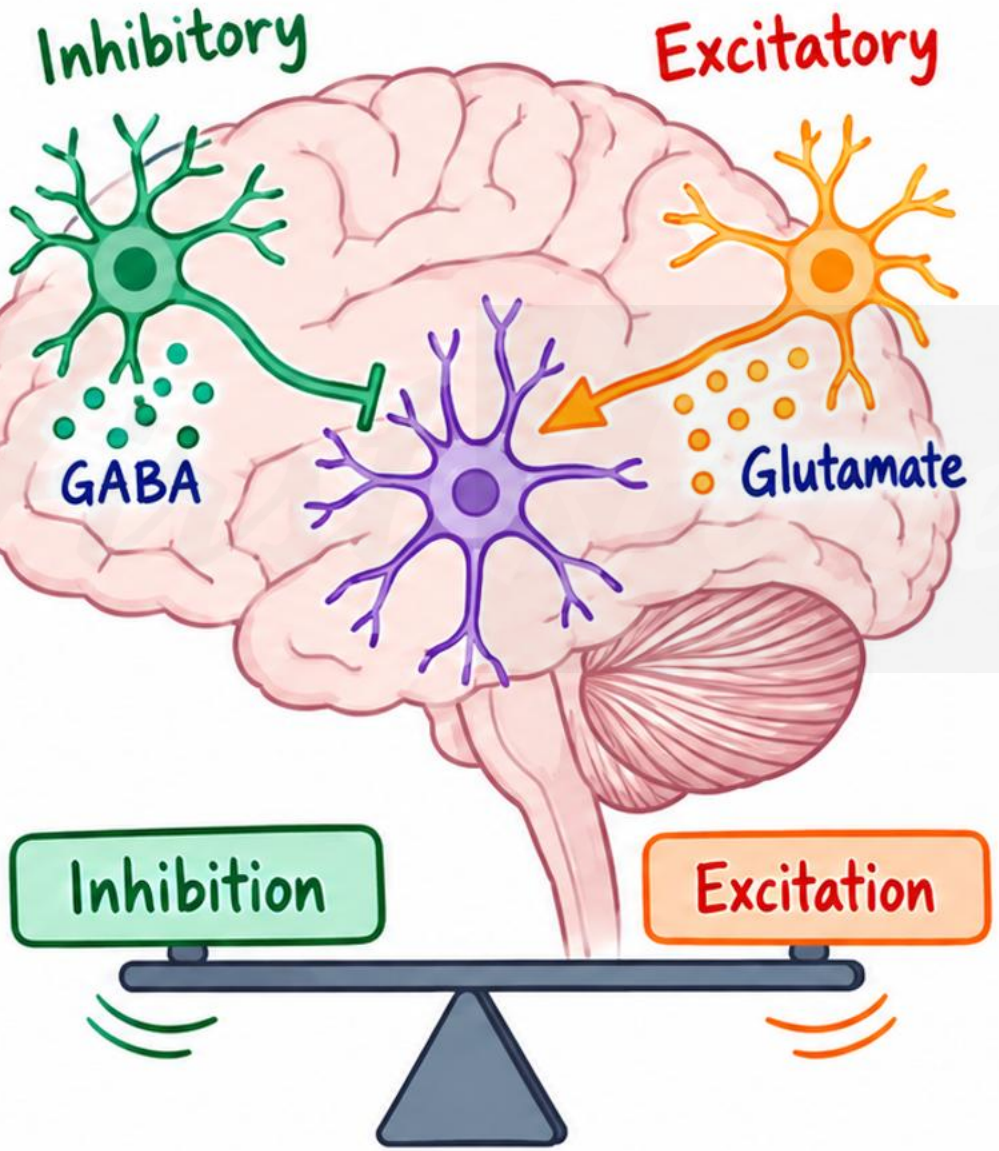


# Epilepsy: seizures and mechanisms

Epilepsy is a disorder with an enduring predisposition to unprovoked seizures.

A seizure is transient abnormal, excessive or synchronised neuronal activity.

An acute provoked seizure, such as one caused by hypoglycaemia, does not automatically mean epilepsy.



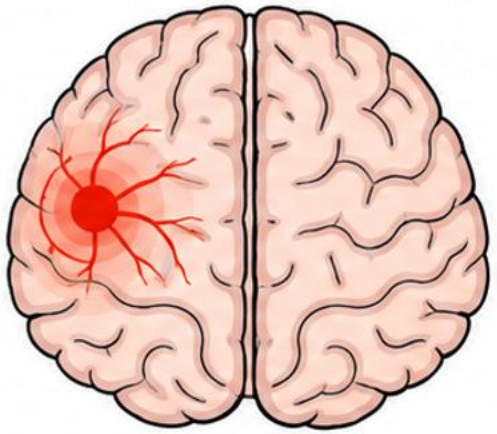

Increased excitation or reduced inhibition can disturb brain networks.

Ion-channel changes, structural injury and genetic, metabolic, infectious or immune causes may contribute.

GABA is a major inhibitory transmitter; glutamate is a major excitatory transmitter.

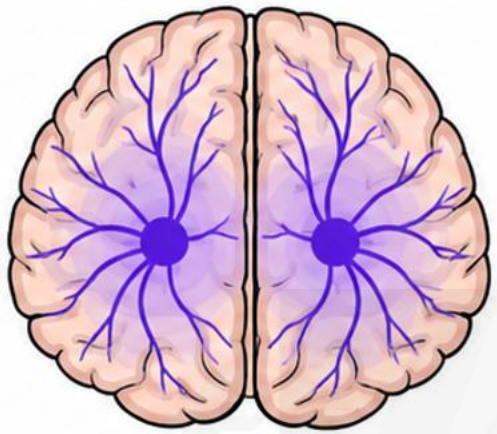
# Seizure types and diagnosis

## Focal seizures



Focal seizures begin in a network within one hemisphere.

## Generalised seizures



Generalised seizures involve networks on both sides from onset.

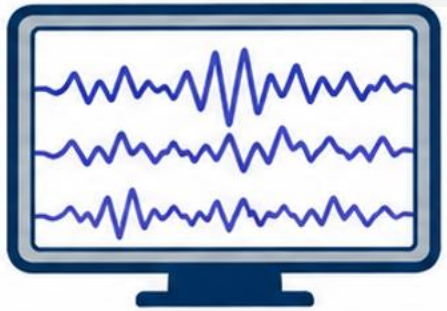
Some seizures have unknown onset or remain unclassified.

Features may include altered awareness, sensory symptoms, motor activity or an aura.

Not every seizure causes convulsions.



Witness history and postictal features are important.



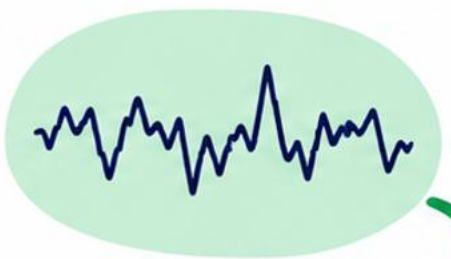
EEG supports classification; a normal EEG does not exclude epilepsy.



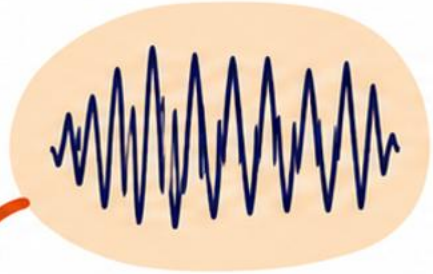
MRI assesses structural causes; urgent CT and laboratory tests are selected for the clinical setting.

# Antiseizure medicines: match the seizure

**Focal seizures:** lamotrigine or levetiracetam are common first-line choices.

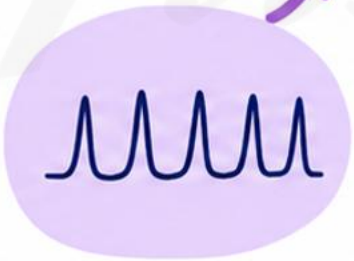


**Generalised tonic-clonic seizures:** options include lamotrigine, levetiracetam or valproate, subject to safety restrictions.



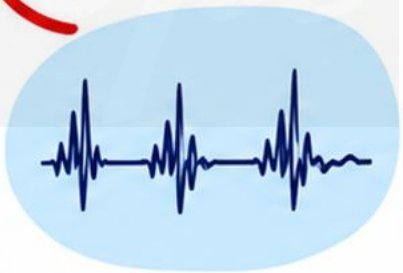


**Pure absence seizures:** ethosuximide is a usual first-line option.





**Myoclonic seizures:** levetiracetam or appropriately selected valproate may be used.

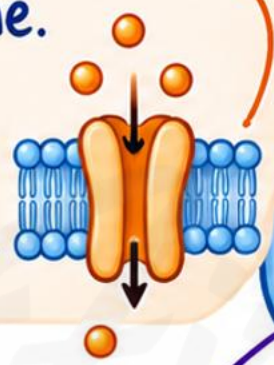


Other options include lacosamide, topiramate, zonisamide and clobazam.
Choose by seizure type, comorbidities, interactions and reproductive risks.
Some medicines can worsen particular generalised seizure types.

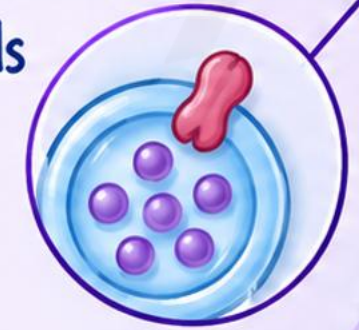
# How antiseizure medicines work

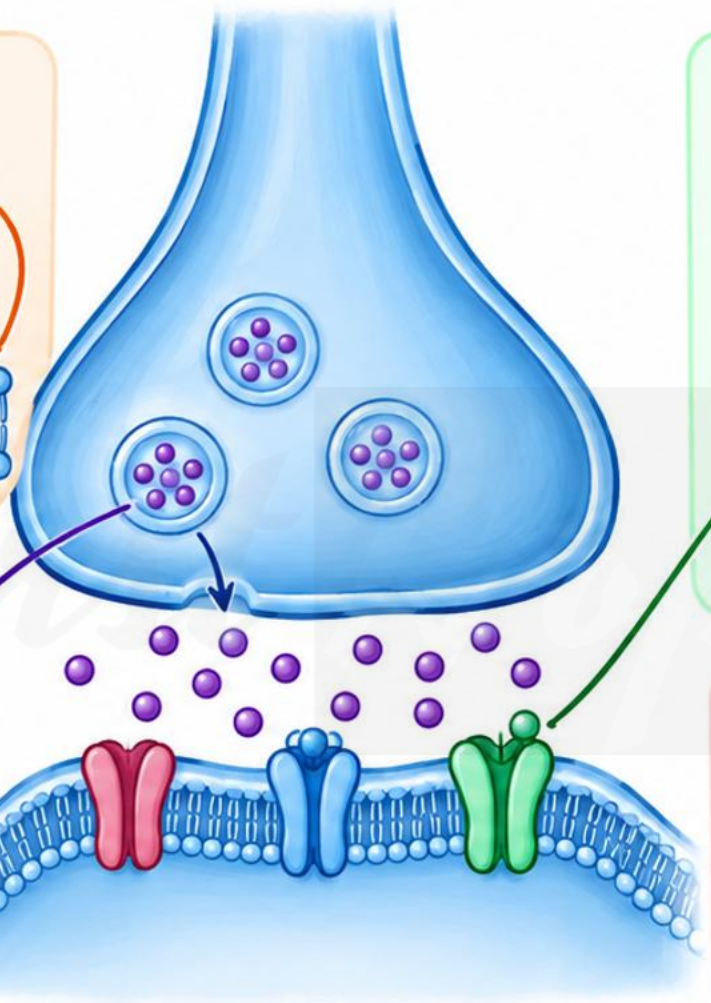
**Sodium-channel modulation:** examples include carbamazepine, phenytoin and lamotrigine.

**Lacosamide** enhances slow sodium-channel inactivation.

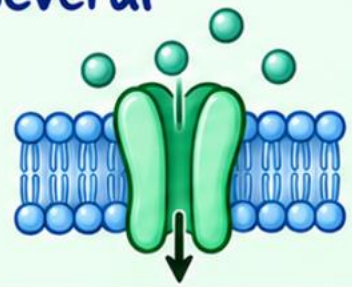


**Levetiracetam** binds synaptic vesicle protein SV2A.

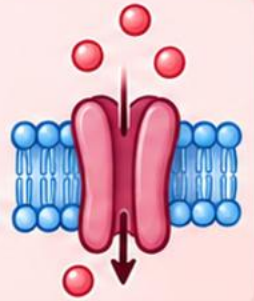




**GABA-related inhibition:** benzodiazepines enhance GABA-A receptor activity; valproate has several mechanisms.



**Ethosuximide** reduces thalamic T-type calcium-channel activity



Mechanism alone does not determine the correct medicine.

Match the seizure syndrome and consider interactions, organ function and adverse effects.

Use combination therapy carefully when an appropriate single medicine is insufficient.

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