

Pathophysiology of Epilepsy:

Seizure: single occurrence of jerky movements & other features of a fit

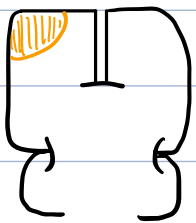
↳ temporary, unstoppable surge of electrical activity in your brain

Epilepsy: two or more unprovoked seizures in an individual.

Classification of Epilepsy:

Focal
Generalised
Epileptic spasms

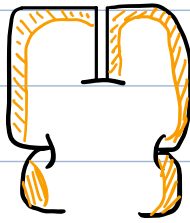
FOCAL - in a particular part / side of the brain



WITH loss of consciousness
[+ LOC]

WITHOUT loss of consciousness
[- LOC]

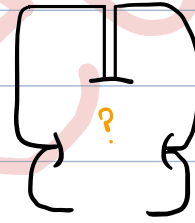
GENERALISED - multiple areas of cortex are agitated



→ Present with LOC

- (i) Tonic-clonic
- (ii) Tonic
- (iii) clonic
- (iv) Atonic
- (v) Myoclonic
- (vi) absence seizures

EPILEPTIC SPASMS



- mechanism not known

- [i] Benign Rolandic Seizures
- [ii] West Syndrome
- [iii] Lennox Gastaut Syndrome

Causes / Triggers of Epilepsy: mnemonic = VITAMIN D, E

V: vascular etiology (intracranial haemorrhage / subarachnoid haemorrhage, acute ischemic stroke)

I: infectious (meningitis, encephalitis)

T: Trauma (epidural hematoma, subdural hematoma)

A: autoimmune (SLE, paraneoplastic origin)

M: metabolic (hyponatremia, hyper/hypo glycemia, thyroid disorders)

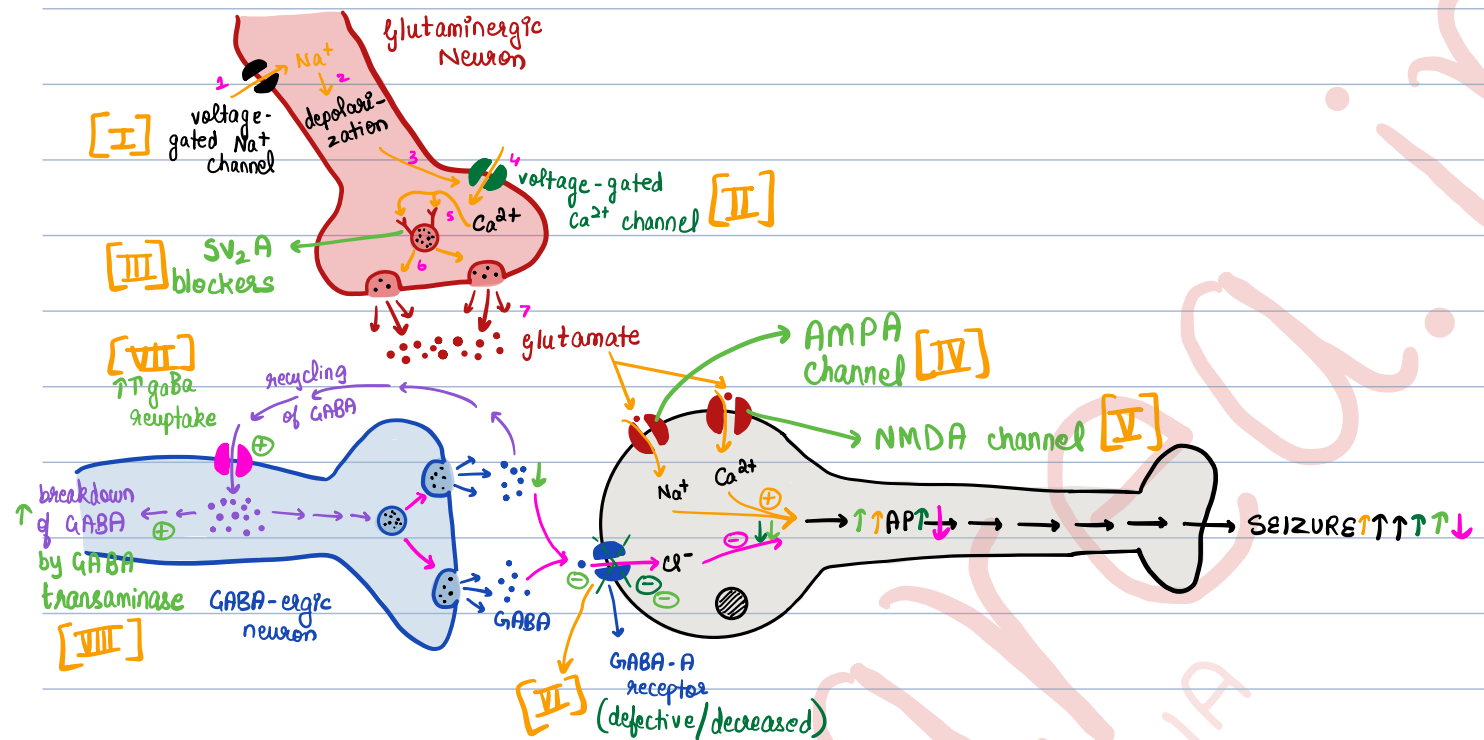
I: idiopathic

N: Neoplasia (mass)

D: Drugs & toxins

E: Eclampsia

Mechanism of Epilepsy: $\left\{ \begin{array}{l} \text{increased glutamate activity} \\ \text{decreased GABA activity} \end{array} \right.$



Anti-Epilepsy Drugs (AEDs):

[I] Na^+ Channel Blockers:

- Carbamazepine
- Oxcarbazepine
- Phenytoin
- Fosphenytoin
- Lamotrigine
- Topiramate
- Valproate
- Lacosamide

[II] Ca^{2+} Channel Blockers:

- Ethosuximide

[III] SV_2A Blockers:

- Levetiracetam

[IV] AMPA Blocker:

- Felbamate

[VI] GABA_A Receptor Agonists:

$\uparrow$ frequency of opening of chloride channels $\Leftarrow$

- Benzodiazepines - Lorazepam, Midazolam, Diazepam, Triazolam, Alprazolam, Clonazepam
- Barbiturates - Phenobarbital, Secobarbital, Pentobarbital, Propofol, Topiramate

[V] NMDA Blocker:

- Ketamine

$\uparrow$ duration of opening of Cl^- channels $\Leftarrow$

[VII] GABA Reuptake Inhibitor:

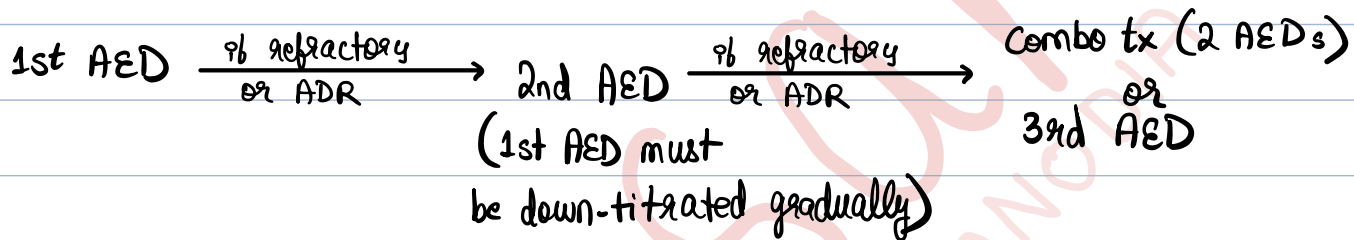
- Tiagabine (primarily used in focal seizures that are refractory to therapy)

[VIII] GABA Transaminase Inhibitor:

- Valproate (also Na^+ channel blocker)
- Vigabatrin

A.E.D Approach to Epilepsy:

[ALWAYS TREAT THE CAUSE. THEY MIGHT NOT NEED AN AED.]



Focal Seizures:

- Carbamazepine
- Oxcarbamazepine
- Levetiracetam
- Lamotrigine
- Phenobarbital $\Rightarrow$ best in neonates

Generalized Absence Seizures:

- Ethosuximide
- Valproate
- Lamotrigine

Generalized Myoclonic Seizures:

- Valproate
- Levetiracetam
- Lamotrigine
- Benzodiazepines

Generalized Tonic-Clonic Seizures:

- Valproate
- Levetiracetam
- Lamotrigine
- Topiramate
- Phenytoin / Fosphenytoin
- Phenobarbital $\Rightarrow$ best in neonates

Generalized Status Epilepticus:

• Benzodiazepines

- Fosphenytoin
 - Valproate
 - Levetiracetam
 - Lacosamide
- } prophylactic
(for prevention of Status epilepticus)

↓ refractory

• Propofol / ketamine

↓ refractory

• Barbiturates

Benign Rolandic Spasm:

- Lamotrigine

West Syndrome:

- Vigabatrin

Lennox Gastaut Syndrome:

- Valproate
- Topiramate
- Lamotrigine
- CANNABIDIOL
- Felbamate

Adverse Effects of AEDs:

• Cardiac / Respiratory Depression:

- Bradycardia
- Hypotension
- ↓ RR
- ↓ respiratory depth

⇒

- Benzodiazepines
- Barbiturates
- Propofol

• Stevens - Johnson Syndrome:

- disorder of skin & mucous membrane with flu-like symptoms (fever, rashes, sore throat, joint pain, cough)

⇒

- Ethosuximide
- Carbamazepine
- Lamotrigine

• Hepatotoxicity:

- in case of underlying liver diseases, avoid these

⇒

- Valproate
- Carbamazepine
- Felbamate

• CYP 450 Interactions:

Inducers

- Barbiturates
- Phenytoin
- Carbamazepine

Inhibitors

- Valproate

• Teratogenic:

- Valproate → Neural tube defects
- Phenytoin / Fosphenytoin → fetal hydantoin syndrome
- Carbamazepine → cleft lip, cleft palate

• Specific ADRs:

- Valproate → Pancreatitis, Thrombocytopenia
- Carbamazepine → SIADH leading to hyponatraemia
- Phenytoin / Fosphenytoin → gingival hyperplasia (reverses on drug withdrawal)
- Vigabatrin → Vision loss
- Topiramate → Metabolic acidosis, kidney stones, glaucoma