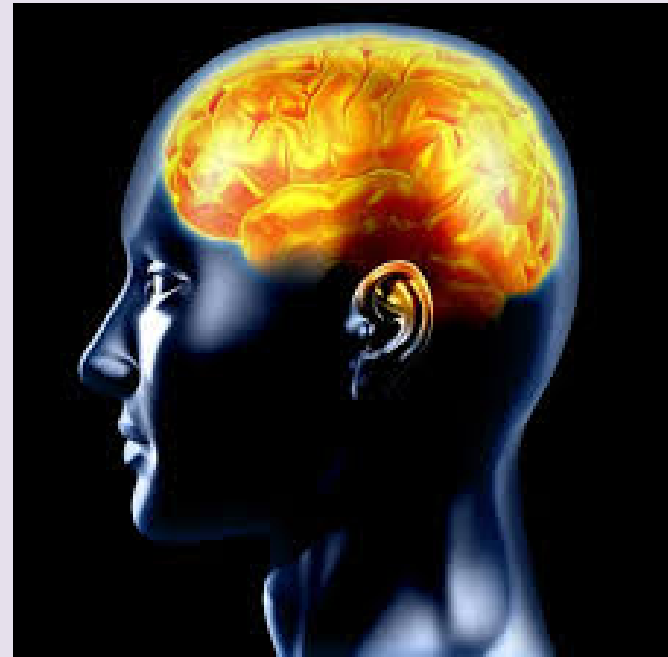


# Antiseizure Drugs

By

Ahmed Shubbar

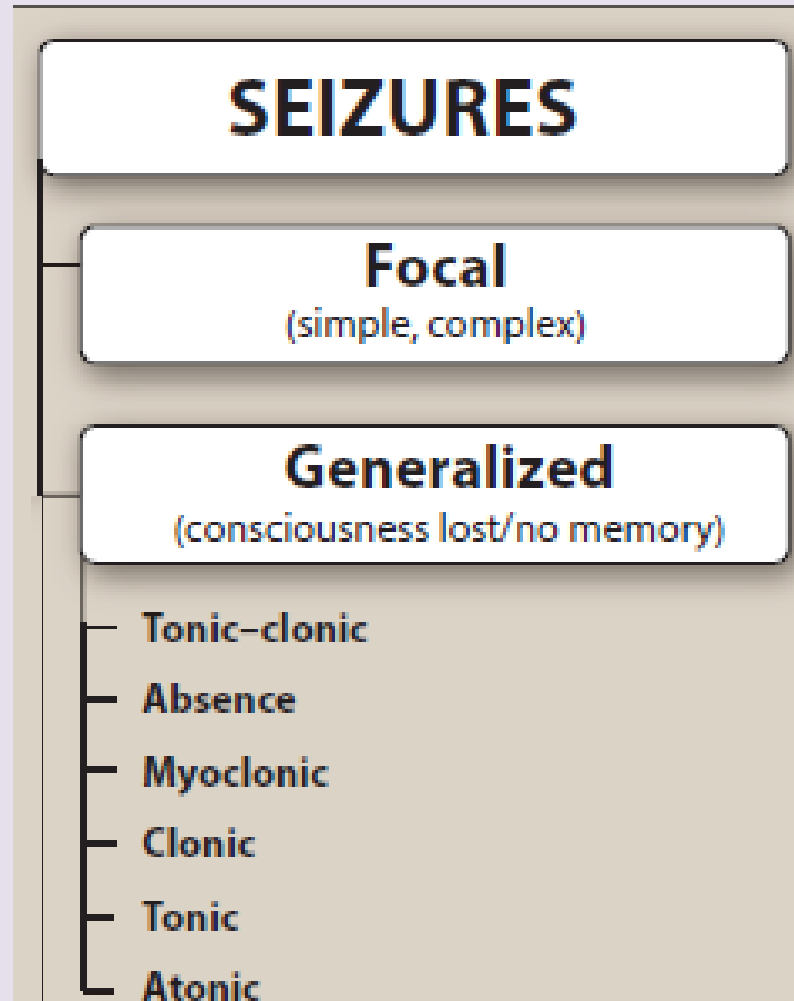
- Epilepsy vs. Seizure ?
- How does seizure occur?

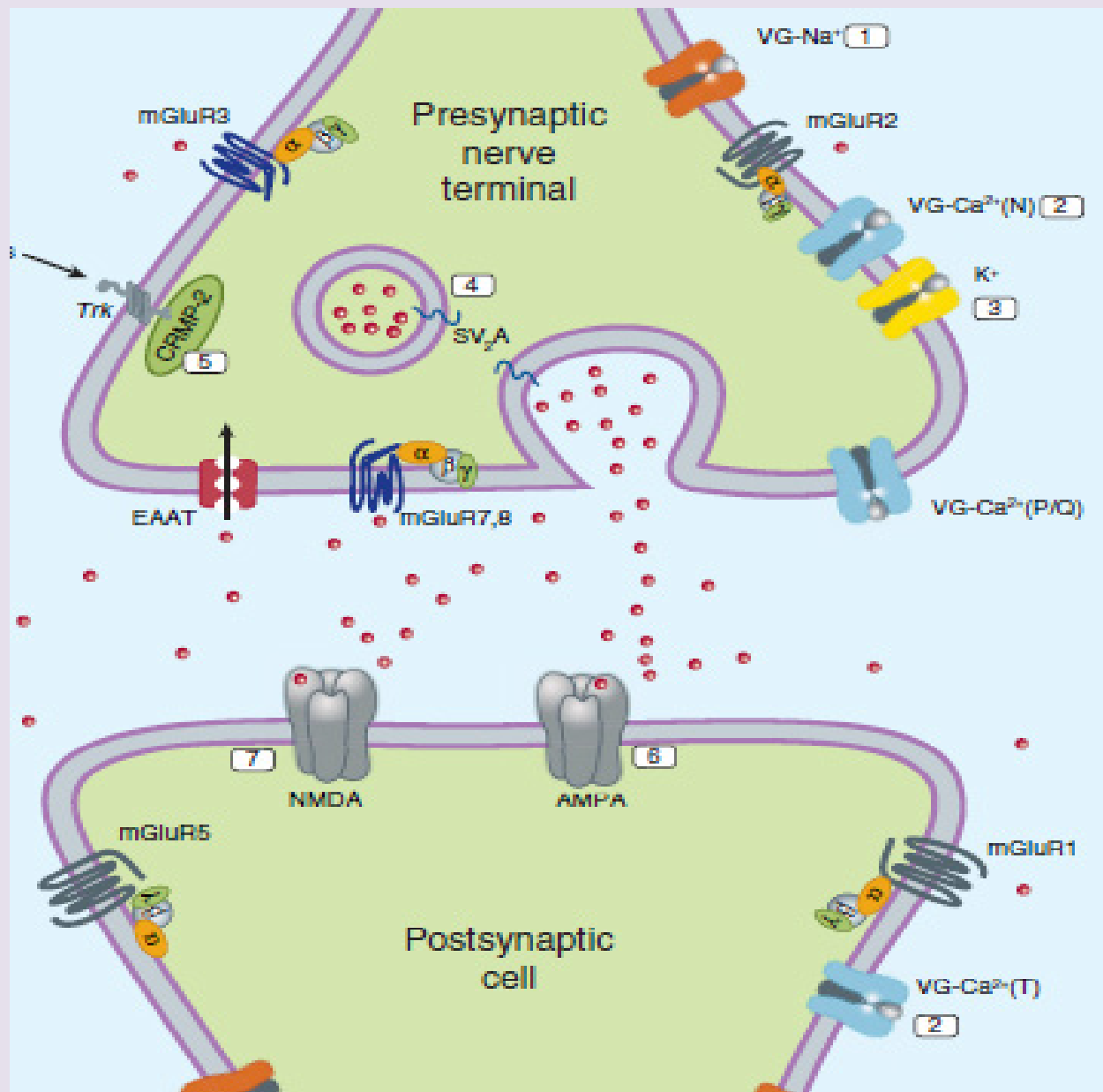


# Epilepsy

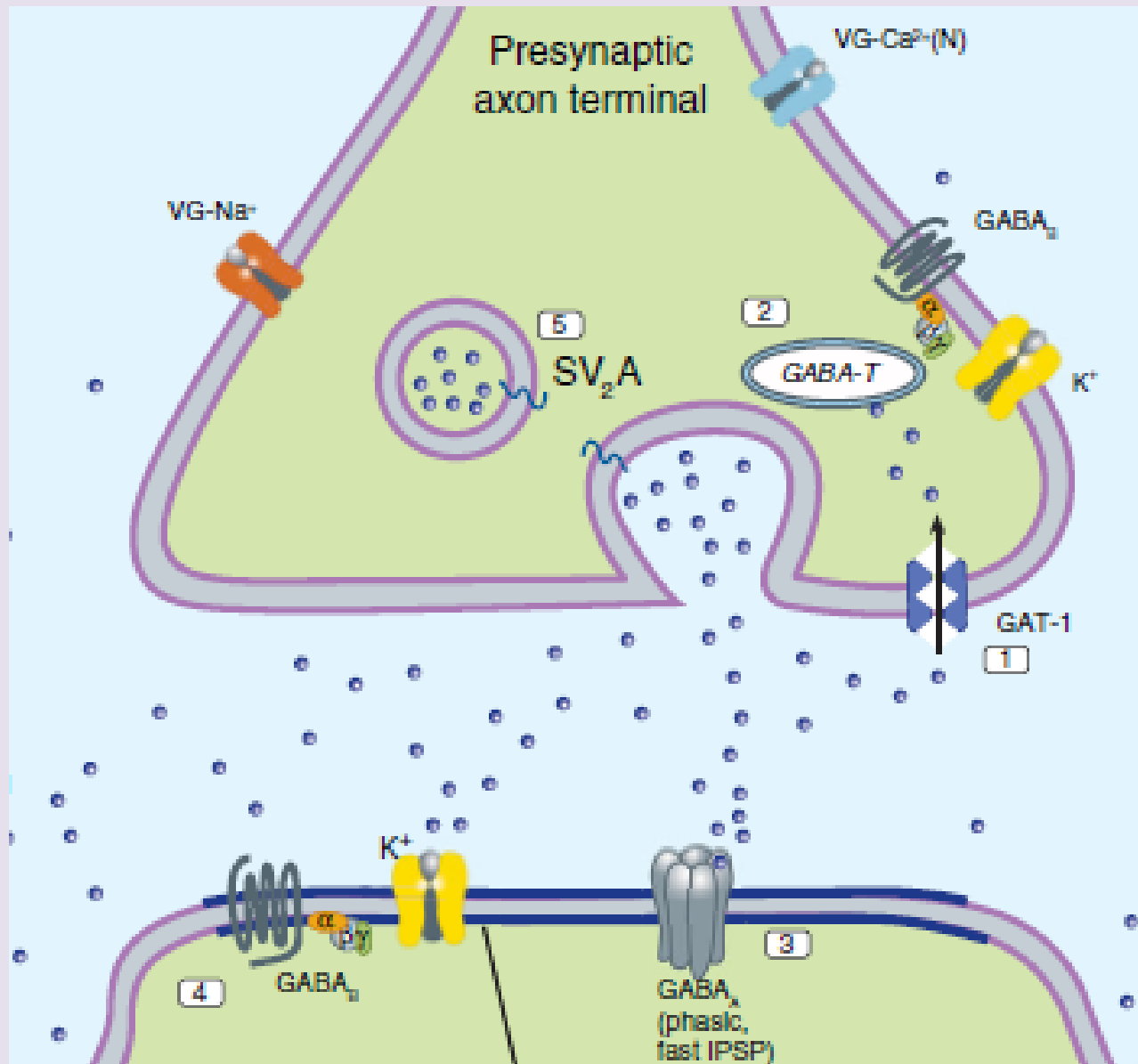
- Occurs due to abnormal excessive neuronal activity in the brain.
- Normally after an excitatory neuron fires it becomes more resistant to firing for a period of time. This is due in part from the effect of inhibitory neurons, or electrical changes within the excitatory neuron. ***In epilepsy the resistance of excitatory neurons to fire during this period is decreased.***

# Types of epilepsy





**Molecular targets for antiseizure drugs at glutamatergic (excitatory) synapse**



**Molecular targets for antiseizure drugs at GABAergic (inhibitory) synapse**

# 1. Na<sup>+</sup> channel blockers

- ☐ Carbamazepine (also oxacarbazepine , eslicarbazepine).
- ☐ Phenytoin (also fosphenytoin, ethotoin , mephenytoin).
- ☐ Valproate .
- ☐ Topiramate.
- ☐ Felbamate.
- ☐ Zonisamide .
- ☐ Lacosamide .
- ☐ Rufinamide
- ☐ Lamotrigine.

## 2. $\text{Ca}^{+2}$ channel blockers

- Ethosuximide, Valproate , and Zonisamide (*T-type  $\text{Ca}^{+2}$  channel*).
- Lamotrigine , Topiramate (*other types of  $\text{Ca}^{+2}$  channels*).



### 3. GABA-related

- BDZ , phenobarbital and primidone.
- Facilitate GABA action (valproate, topiramate and felbamate).
- Inhibition of GABA-T (Vigabatrin and valproate).
- Inhibition of GAT-1 (Tiagabine).

## 4. Other mechanisms

- NMDA-R antagonism (Felbamate).
- K<sup>+</sup> channel facilitation (Ezogabine).
- Interaction with SV<sub>2</sub>A protein (Levetiracetam).
- Unknown mechanism: ***Gabapentin*** and ***Pregabalin*** , in spite of their close structural resemblance to GABA, they do not act directly on GABA-R. They may, however, modify release of GABA.

# Adverse effects

- **Carbamazepine:** diplopia , ataxia and autoinduction.
- **Phenytoin:** diplopia , ataxia , nystagmus , gingival hyperplasia and fetal hydantoin syndrome.
- **Valproate:** GI- and hepato-toxicity.
- **Felbamate:** aplastic anaemia & hepatic failure.
- **Zonisamide:** renal stones , c.i. in sulfonamide allergy.

Thank you

# References

- Basic & Clinical Pharmacology , Bertram G. Katzung  
12<sup>th</sup> edition .
- Lippincott's Illustrated Reviews: Pharmacology ,  
6<sup>th</sup> edition .
- Goodman & Gilman's The Pharmacological Basis of  
Therapeutics, 12<sup>th</sup> ed. .