

DEFINITION:

Epilepsy is a common neurological condition characterized by recurrent seizures (that usually occur unpredictably), loss of consciousness with or without body movements. It is derived from a Greek word Epi-upon, Leptos-seizures. It is also known as seizure disorder.

Seizure is a phenomenon characterized by an excessive, hypersynchronous discharge of cortical neuronal activity (measured by EEG), featured by disturbances in consciousness, sensory motor systems, subjective well-being and objective behaviour.



ETIOLOGY:

In 20% cases cause can be determined, rest 72% are idiopathic (of unknown cause).

1. **Inherited/genetic causes:** Single gene mutation (<2%), multiple genes + environmental factors, genetic disorders (down, dravet etc.), >200genes have the capability of causing epilepsy.
2. **Acquired causes:** Head trauma, neurosurgery, cerebrovascular disease, infections (meningitis, influenza, toxoplasmosis, mumps, measles, syphilis), metabolic disorders (such as hypoglycemia and hypocalcemia), intracranial neoplasms.
3. **Congenital causes:** Inborn error of metabolism.
4. **Withdrawal of drugs:** Alcohol, benzodiazepines, barbiturates, antiepileptics.
5. **Drugs that induce seizures:** Some of the antibiotics, antidiabetics, anesthetics, antimalarials, antispastics, antidepressants, antipsychotics, mood stabilizers.

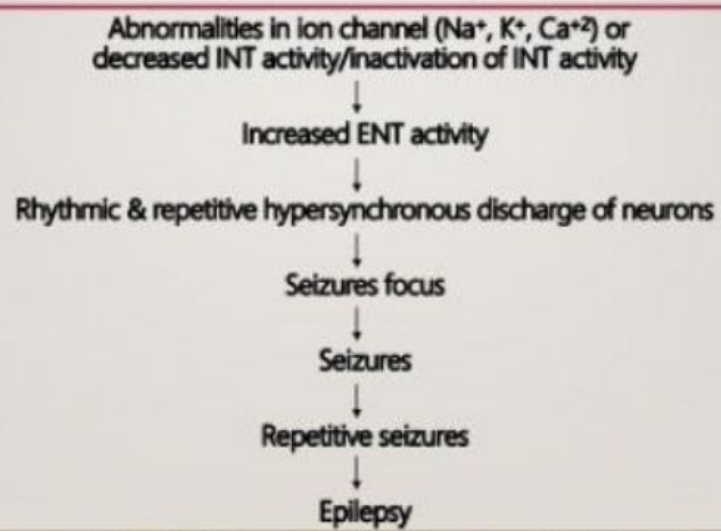
PATHOPHYSIOLOGY:

- Neurons are inter-connected in a complex network. Each individual neuron is linked with hundreds of other neurons via synapses.
- Neurons discharge electrical current and neurotransmitters are released at synaptic levels and permits inter-communication.
- Neurotransmitters are of two types: Inhibitory neurotransmitters (INT) and Excitatory neurotransmitters (ENT).
- **Inhibitory neurotransmitters (GABA):** GABA (Gamma amino butyric acid) acts on ion channels and increases chloride outflow & decreases chances of action potential formation.
- **Excitatory neurotransmitters (aspartate, glutamate):** Aspartate and glutamate allows sodium and calcium influx which paves way for action potential formation.

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- In this manner, information is conveyed, transmitted and processed throughout the CNS. Seizures occur due to the imbalance between the above inhibition and excitation.
- A normal neuron discharges repetitively at low baseline frequencies. If neurons are damaged, injured/suffer a chemical/metabolic insult, the changes in discharge pattern develops.
- During epilepsy, regular low frequency discharges are replaced by bursts of high frequency discharges followed by periods of inactivity.
- A single neuron discharging in an abnormal manner is usually not clinically significant. But when a whole population of neurons discharge synchronously in an abnormal manner, epileptic seizure is precipitated. This abnormal discharge may remain localized or it may spread to adjacent areas, recruiting more neurons as it expands.

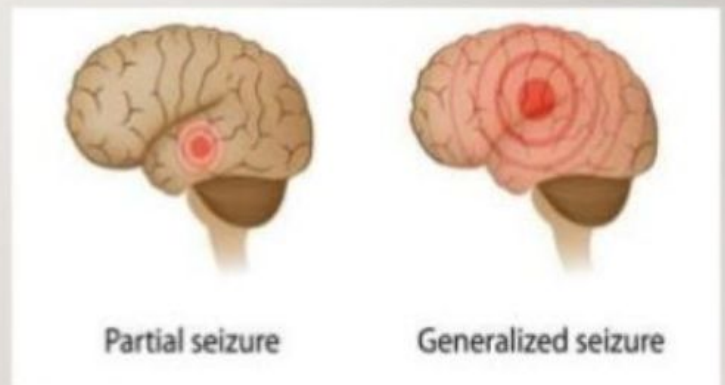
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TYPES OF EPILEPSIES INCLUDING CLINICAL MANIFESTATIONS:

Based on International League Against Epilepsy (ILAE), they are classified into:

1. Partial seizures (focal seizures)
2. Generalized seizures



1. PARTIAL/FOCAL SEIZURES (SEIZURES BEGIN LOCALLY):

It is the most common type of seizures, localized to a neuronal system, limited to part of one cerebral hemisphere. Types of partial seizures include:

a) Simple partial seizures (without impairment of consciousness):

It is not associated with loss of consciousness. It is associated with motor signs (convulsive jerking, lip smacking), sensory and somatosensory signs (paresthesias, auras), autonomic signs (sweating, flushing, behavioural manifestations (dysphasia, structured hallucinations).

b) Complex partial seizures (with impairment of consciousness):

It is associated with impaired consciousness, impairment proceeds/follows seizures. It is also associated with purposeless behaviour, glassy stare, aimless walking, hallucinations (visual, auditory), aggressive behaviour.

c) Secondary generalized seizures: Partial onset evolving to generalized tonic-clonic seizures.

2. GENERALIZED SEIZURES:

a) Absence seizures:

It is also known as 'petit mal' seizure. It happens exclusively in childhood and early adolescence. It is associated with alterations of consciousness, staring with occasional eye-blinking, enuresis. These attacks last only for few seconds and often go unrecognized.

b) Myoclonic seizures:

It is also known as 'bilateral massive epileptic myoclonus'. It is associated with involuntary, rhythmic jerking of facial, limb/trunk muscles.

c) Clonic seizures: It is associated with sustained muscle contractions, altering with relaxation.

d) Tonic seizures: It is associated with sustained muscle contractions (stiffening).

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e) Generalized tonic-clonic seizures:

It is also known as 'grand mal' seizure. It leads to sudden loss of consciousness, the individual becomes rigid and falls to the ground. It is associated with interrupted respirations, extended legs, rapid bilateral muscle jerking, heavy salivation, tongue biting, headache, confusion. It lasts for one minute.

In some cases, grand mal seizure occurs repeatedly with no recovery of consciousness between attacks, leading to state known as 'status epilepticus'.

f) Atonic seizures:

It is also known as 'drop attack'. It occurs mainly in children. It is associated with sudden loss of postural tone and the individual falls to the ground.

RISK FACTORS:

1. Sleep deprivation.
2. Missed doses of anti-epileptic drugs (AEDs) in treated patients.
3. Alcohol withdrawals, recreational drug misuse.
4. Physical and mental exhaustion.
5. Flickering lights (includes TV, computer screens; comes under generalized epilepsy syndrome).
6. Intercurrent infections.
7. Metabolic disturbances.
8. Uncommon reasons like loud noises, very hot baths etc.