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Diploma in Pharmacy 2nd Year
Pharmacotherapeutics
Chapter 2 (d) : Central Nervous System

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Central Nervous System

- The principal functional unit of the central nervous system (CNS) is the neuron.
- Neuron is the structural and functional unit of the nervous system; it has the unique ability to receive and transmit information.
- Neurons of different types and in different locations have distinct properties, including functional roles, distribution of their connections, neurotransmitters used, metabolic requirements, and levels of electrical activity at a given moment.
- In addition to neurons the CNS contains other cells, such as astrocytes and oligodendrocytes, which make up the neuroglia. During any injury or abnormality these cells undergo a range of functional and morphological changes and leads to many of neurological disorders.

Clinical consideration

- + Epilepsy.
- + Parkinson's disease.
- + Alzheimer's disease.
- + Stroke.
- + Migraine.
- + Encephalopathy
- + Seizure.

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Epilepsy

- Epilepsy is a nervous system disorder due to abnormal electrical activity in brain cells, it is also called seizure and convulsant.
- This disorder results contraction , involuntary movement , shaking of the body etc.



Classification of seizures

- Seizure is classified on the basis of behavioural and electrophysiologic pattern of activity as

1. Partial (Focal seizures)

- ⇒ It mainly appears in only one hemisphere.
- ⇒ That means symptoms only happen in a specific part or on one side of your body. But focal seizures can sometimes spread and become generalized seizures.
 - a) Simple partial seizures with motor, sensory, or autonomic symptoms.
 - b) Complex partial seizures.
 - c) Partial seizures with secondary generalization.

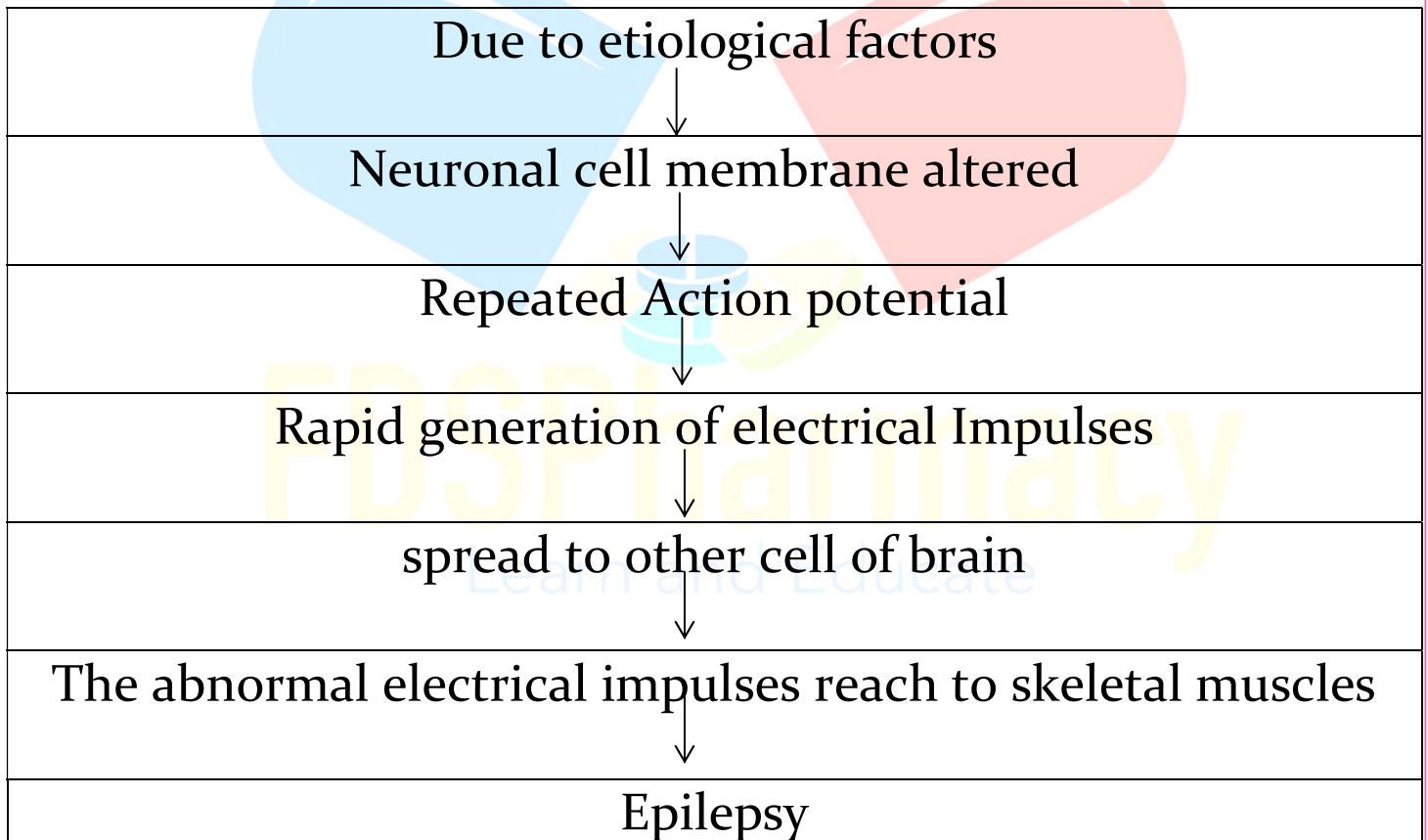
2. Generalized seizures

- ⇒ These are seizures that happen in both hemispheres of your brain side. These seizures tend to cause more severe effects and symptoms.
 - a. Absence seizures.
 - b. Tonic- clonic seizures.
 - c. Other (Myoclonic, tonic, clonic, atonic)

Etiology

- Brain injury
- High fever
- lack of oxygen to brain
- Brain tumor
- Genetic brain disorder
- Stroke (reduce blood supply to brain)

Pathogenesis



Clinical Manifestation

- ✦ Recurrent of seizure
- ✦ Sudden stiffness due to unknown reason
- ✦ Sudden falling due to unknown reason
- ✦ Sudden bouts of chewing due to unspecific reason
- ✦ Rpetitive involuntary movement
- ✦ Changes in sense of smell touch and sound

Non Pharmacological Management

- ❖ Ketogenic diet is useful in children are suffering from seizure . ketogenic diet is a high -fat adequate protein , and low carbohydrates diet for example fish , meat , eggs , seafood etc

Pharmacological managements

- ❖ Benzodiazepines— ex- clonazepam, lorazepam, diazepam.
- ❖ Barbiturates— ex- phenobarbital, desoxyphenobarbital.
- ❖ Deoxy barbiturates— ex- primidone.
- ❖ Hydantoin— ex-phenytoin, ethotoin.
- ❖ Aliphatic carboxylic Acid— ex- valproic acid, magnesium valproate.
- ❖ Oxazolidine derivatives— ex- trimethadione, paramethadione.
- ❖ Cyclic GABA Analogues— ex- gabapentin, pregabalin.
- ❖ Iminostilbene— carbamazepine, oxcarbazepine.
- ❖ Other drugs— ex- levetiracetam, parampanel, brivaracetam, lacosamide

Parkinson's Disease

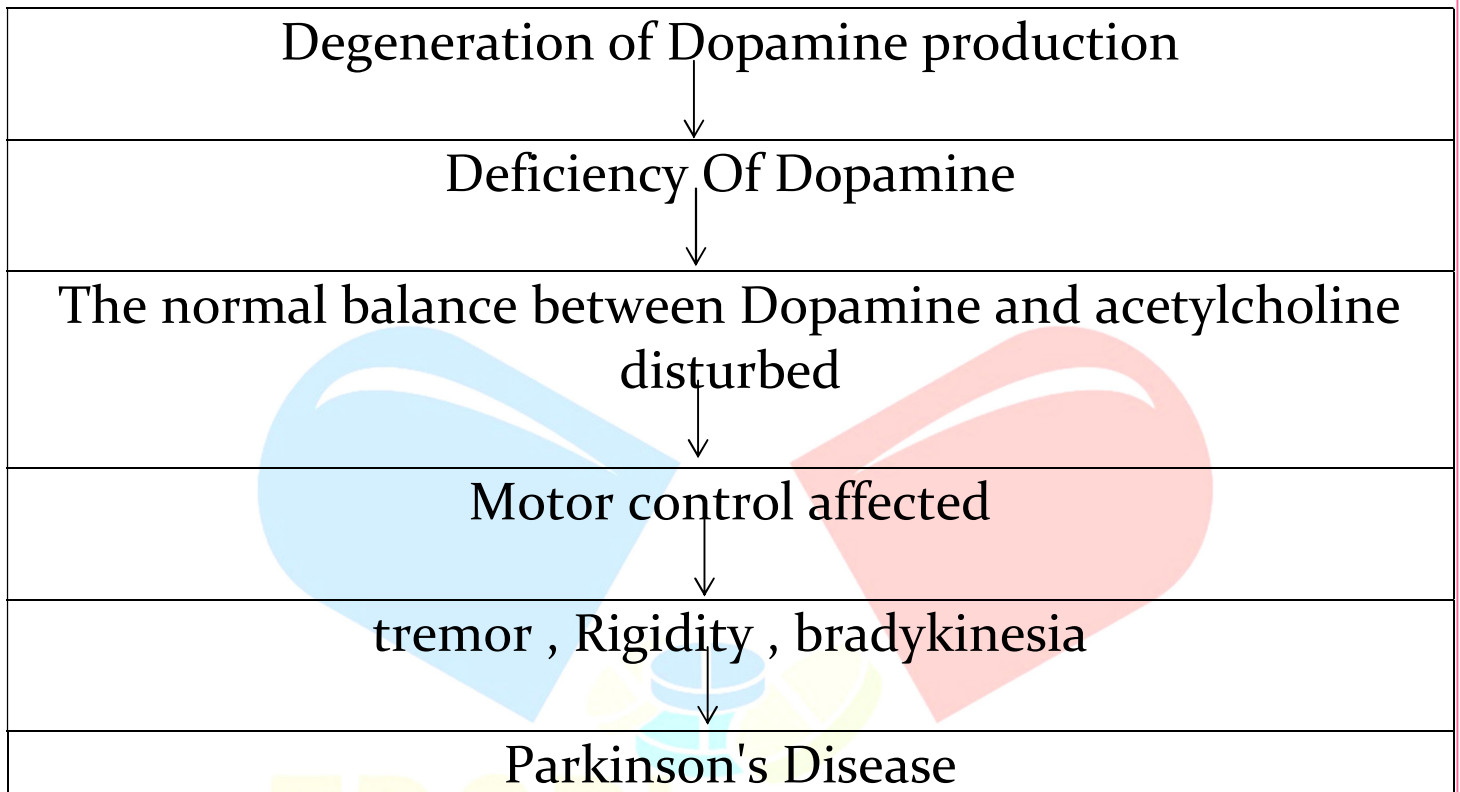
→ It is a chronic, progressive, neurodegeneration disorder. in which slows down the voluntary movement of body parts (bradykinesia), muscles tone changed (rigidity) and tremor at rest.



Etiology

- Genetic factors
- Advancing age : above 60 year mostly scene
- Head injury
- Drugs : like neuroleptics ,antiemetics etc.
- Exposure to toxin.
- Low production of Dopamine

Pathogenesis of Parkinson 's Disease



Clinical Manifestation

- ✚ Slow moment
- ✚ Tremor / trembling
- ✚ Low volume of speech
- ✚ Dropping of saliva
- ✚ Constipation
- ✚ Tendency to fall backwards
- ✚ Depression

Non Pharmacological Management

- ❖ Avoid and discard the all activities which cause/induce the depression, stress, sleep disorders etc.
- ❖ Follow and change the diet plans according to own demand or prescription by any RMP
- ❖ Practice the yoga, meditation, physical exercise regularly. Ventilation is one of the reasons which leads to brain disorders and cardiac disorders also
- ❖ Practice of herbal/natural medicine other than allopathic.
- ❖ Do such all activities which makes you happy and cheerful.

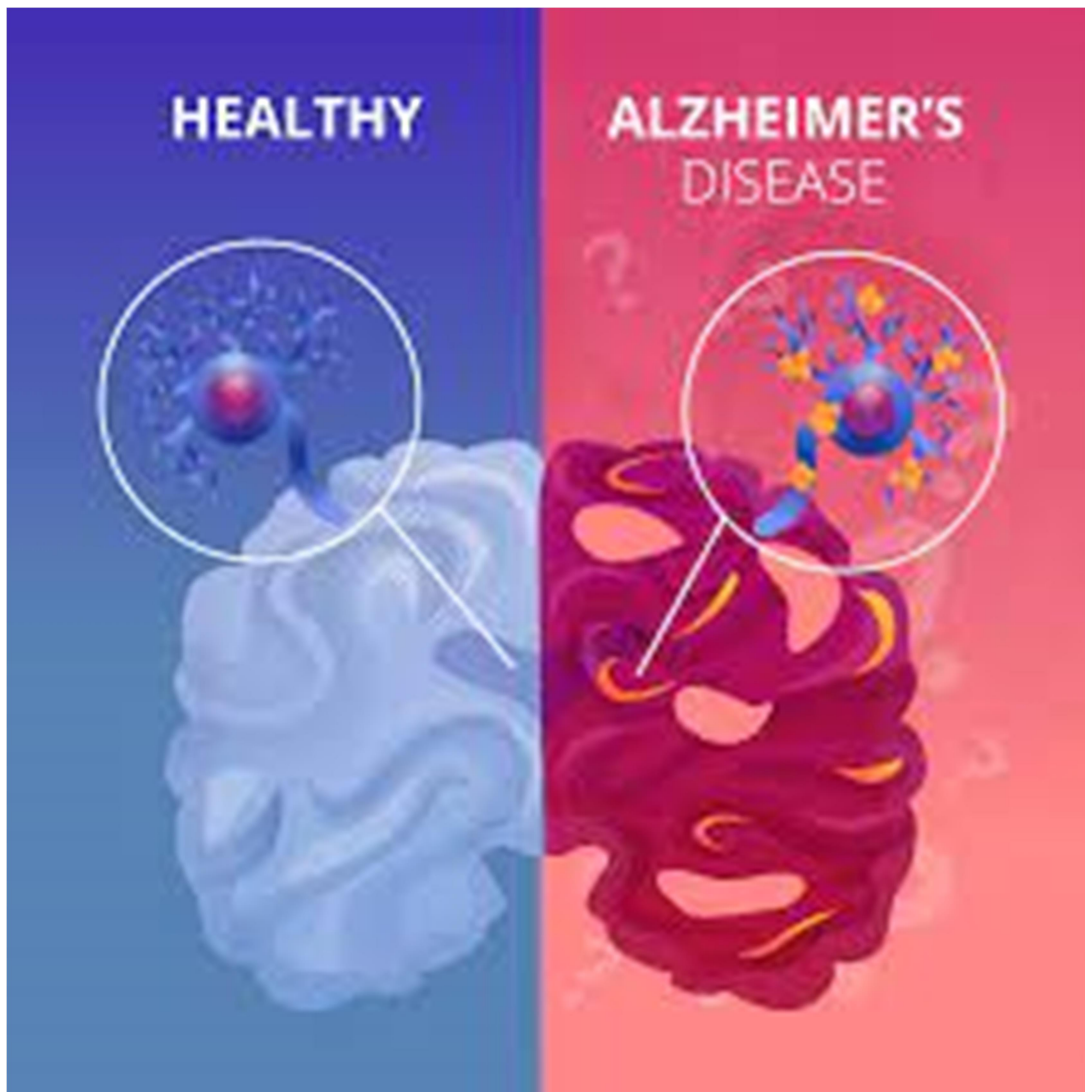
Pharmacological Management

- ❖ **Levodopa** : It converts into dopamine when reach to the brain . It is the most effective drug For PD.
- ❖ **Dopamine agonist** : Bromocriptine , ropinirole : They work like dopamine on dopaminergic receptors.
- ❖ **MAOI** : Selegiline , Rasagline.
- ❖ **Anti-cholinergic drugs** : Benztropine , Procyclidine.

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Alzheimer 's Disease

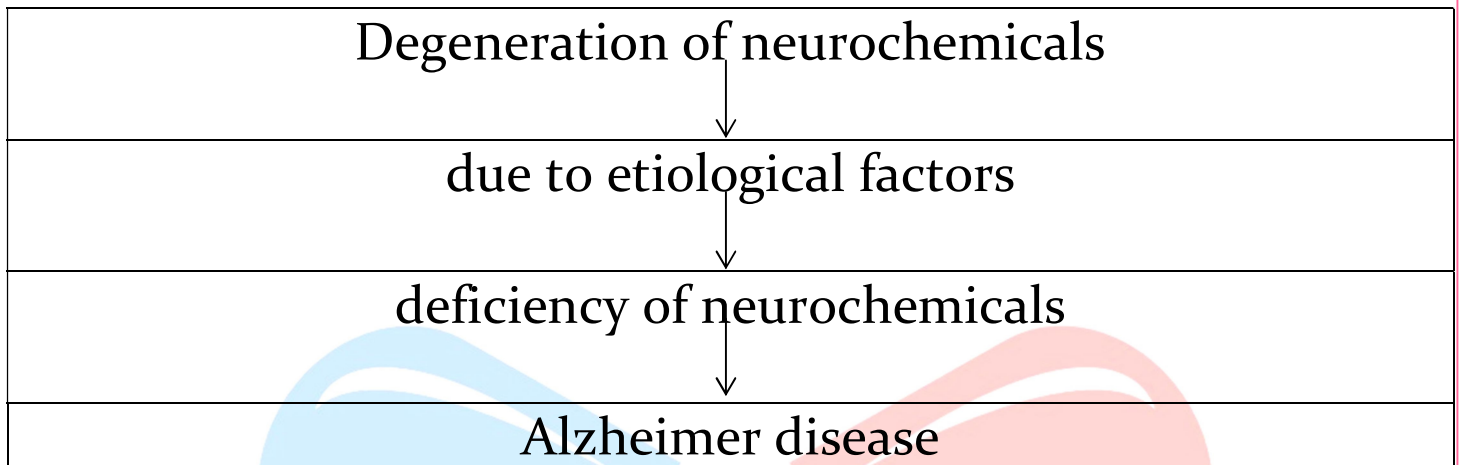
→ Alzheimer's disease is a chronic irreversible neurodegeneration disease which gradually destroy the ability to think, remember, and learn ,and involves memory loss.



Etiology

- Neurochemical factor
- Genetic factors
- Environmental factors
- Head injury
- Smoking
- Advancing age (above 65 years).

Pathogenesis



Clinical Manifestation

- ✚ Loss of memory
- ✚ Placing object at unusual place
- ✚ Confusion about events, time and place
- ✚ Asking the same question repeatedly
- ✚ Problem to perform familiar work
- ✚ Getting lost or wandering
- ✚ Problem in sleeping
- ✚ Behaviour changes like agitation , anxiety
- ✚ Poor thinking or understanding
- ✚ Difficulty in recognising family members or friends
- ✚ Difficulty in speaking during choosing the right words.

Non Pharmacological Management

- ❖ Avoid and discard the all activities which cause/induce the depression, stress, sleep disorders etc.
- ❖ Follow and change the diet plans according to own demand or prescription by any RMP
- ❖ Practice the yoga, meditation, physical exercise regularly. Ventilation is one of the reasons which leads to brain disorders and cardiac disorders also
- ❖ Practice of herbal/natural medicine other than allopathic.
- ❖ Do such all activities which makes you happy and cheerful.

Pharmacological Management

- ❖ **Cholinesterase Inhibitors** : Donepezil , galantamine.
- ❖ **Glutamertergic Drugs** : Gabapentin , Lamotrigine

Stroke

- Stroke is a condition in which blood supply to the brain reduced or stops due to blockage or hemorrhage.
- In stroke condition brain function is stopped due to the death of brain cell.
- Stroke is also called brain attack and cerebrovascular accident (CVA).



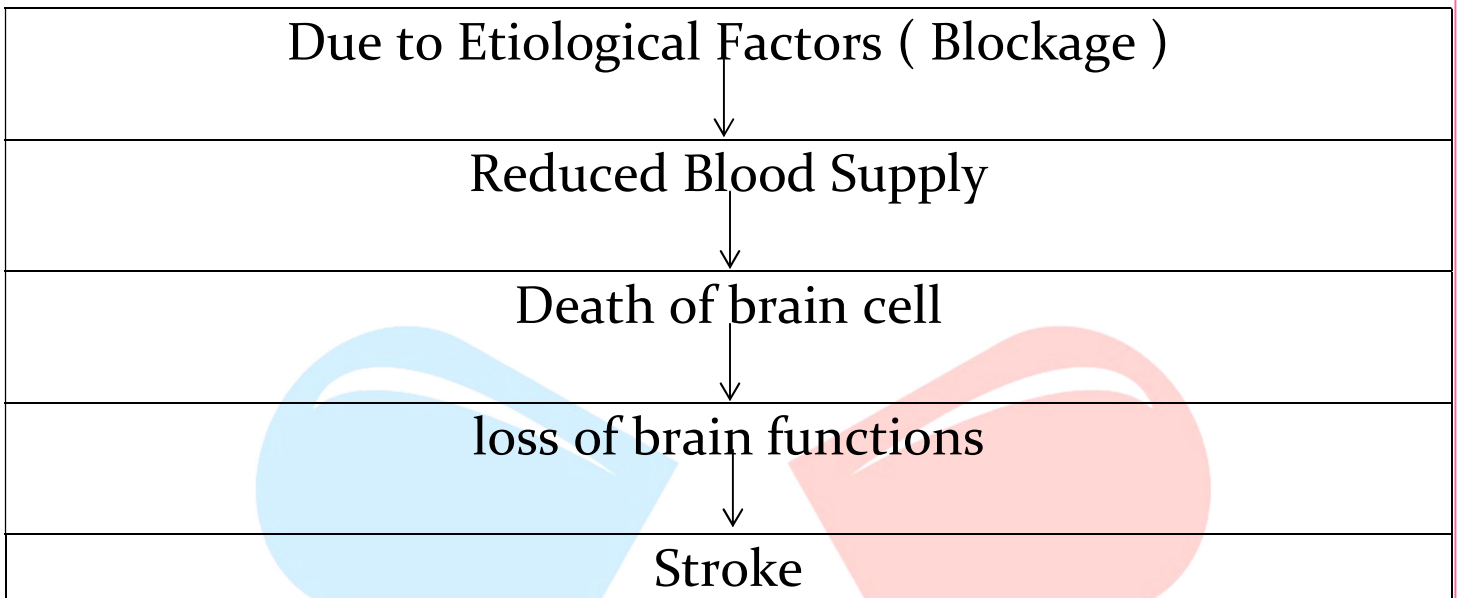
Types

- **Ischemic stroke** : Blood flow to the brain reduced due to narrowed or blocked arteries of brain by Thrombus(lipid deposition) or embolus (blood clot).
- **Haemorrhagic stroke** : Blood flow is disturbed due to leakage of blood vessels of brain.

Etiology

- Blockage in brain arteries
- Leakage in blood vessels
- Diabetes mellitus
- Smoking
- Inactivity
- Obesity
- Alcoholism
- Estrogen use
- Advancing age
- Family history

Pathogenesis



Clinical Manifestations

- ✚ Dizziness
- ✚ Loss of control and coordination
- ✚ Difficulty in speaking and understanding
- ✚ Paralysis in face, leg, arms , mostly on one side of the body
- ✚ Blurred vision
- ✚ Severe headache

Non Pharmacological Management

- ❖ Early Contact to doctor
- ❖ Early Diagnosis

Pharmacological Management

- ❖ Emergency treatment with medications
- ❖ Alteplase Injection : it is given by vein in arm , it dissolves the blood clot and restore the blood flow
- ❖ Anticoagulant drugs : these drugs prevent further blood clot .Heparin , warfarin.

Emergency Procedure for removal of clot

- 1) Surgical Procedure
- 2) **Mechanical clot removal** : Using a catheter a small device is move into the brain , which removes the clot either by grabbing it or by breaking it .

Migraine

- Migraine is a recurrent attacks of headache that affects one side of head.
- Migraine may last 4-48 hours.
- A migraine is a headache that can cause severe throbbing pain or a pulsing sensation, usually on one side of the head and also involving altered regulation and control of afferents, with a particular focus on the cranium. It's often accompanied by nausea, vomiting, and extreme sensitivity to light and sound.



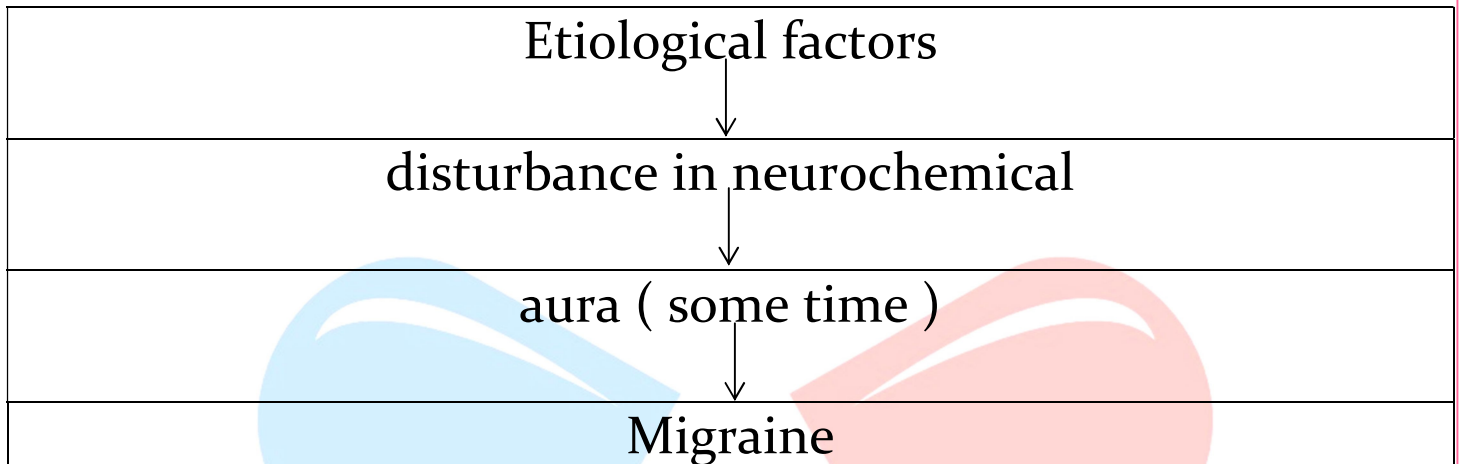
Types

- **Migraine with Aura** : It is a type of migraine in which a person has warning sign (aura) that a migraine attacks is going happen
 - Examples of aura : constipation , mood changes , neck stiffness , increasing urination
- **Migraine without aura** : This is the most common type of migraine.

Etiology

- Abnormal metabolism of serotonin in brain.
- Family History
- Age (above 30)
- Hormonal changes
- Pregnancy
- Oral contraceptives

Pathogenesis



Clinical Manifestation

- ✚ One side headache
- ✚ Nausea and Vomiting
- ✚ Blure vision
- ✚ Sensitivity to light noise or odours
- ✚ Feeling tired
- ✚ Stiff neck

Non Pharmacological Management

- ❖ Should avoid triggers of headache like intense light and sound , and stress etc.
- ❖ Should rest in a dark place

Pharmacological Management

- ❖ **NSAIDs** : Should use in mild to moderate headache. Paracetamol , Ibuprofen , aspirin
- ❖ **Calcium channel blocker** : Amlodipine , Verapamil.
- ❖ **β Blockers** : Atenolol , propranolol.
- ❖ **Antidepressant** : Amitriptyline , Venlafaxine.
- ❖ **Anti- epileptic drugs** : Valproate , carbamazepine.
- ❖ **Vitamins** : Riboflavin (B₂)

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Amir Khan

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