

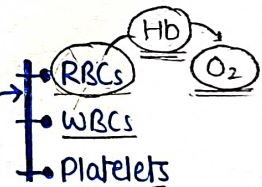
UNIT-3

SYLLABUS

- Haematological Disease : Iron deficiency, Megaloblastic anemia (Vit B12 and folic acid), sickle cell anemia, thalassemia, hereditary acquired anemia,
- Endocrine system : Diabetes, thyroid disease, disorders of sex hormones. Hemophilia
- Nervous System : Epilepsy, Parkinson's disease, stroke, psychiatric disorders : depression, schizophrenia and Alzheimer's disease.
- Gastrointestinal System : Peptic ulcer.

HAEMATOLOGICAL DISEASE

- These are those diseases which occurs in the haematological system.
- Haematology is the branch of science that deals with the study of blood components and blood-forming tissues.
- Blood is made up of : plasma and formed elements



ANEMIA

- It is defined as, it is the reduction of Hemoglobin (Hb) and RBCs concentration in blood below the normal range.
- Due to deficiency of Hb/RBCs, there will be decrease in the amount of O₂ in body, which can cause serious damage/diseases.
- Anemia is the low level of blood in body, mainly RBCs → Hb ↓ O₂.

• It is of following types :

- ① Iron deficiency Anaemia
- ② Megaloblastic Anaemia
- ③ Sickle cell Anaemia
- ④ Thalasemia
- ⑤ Hereditary acquired anemia
- ⑥ Hemophilia

IRON DEFICIENCY ANAEMIA

- It is the most common type of anemia in the world. It occurs due to deficiency of iron (Fe^{2+}) in the blood.
- Iron (Fe^{2+}) is an essential mineral which forms Hemoglobin, These (Hb) contains O_2 and transported it into body
- These Hemoglobin (Hb) further forms RBCs which forms blood.
- So, deficiency of Iron (Fe^{2+}) leads to deficiency of blood which decreases the O_2 supply.

ETIOLOGY

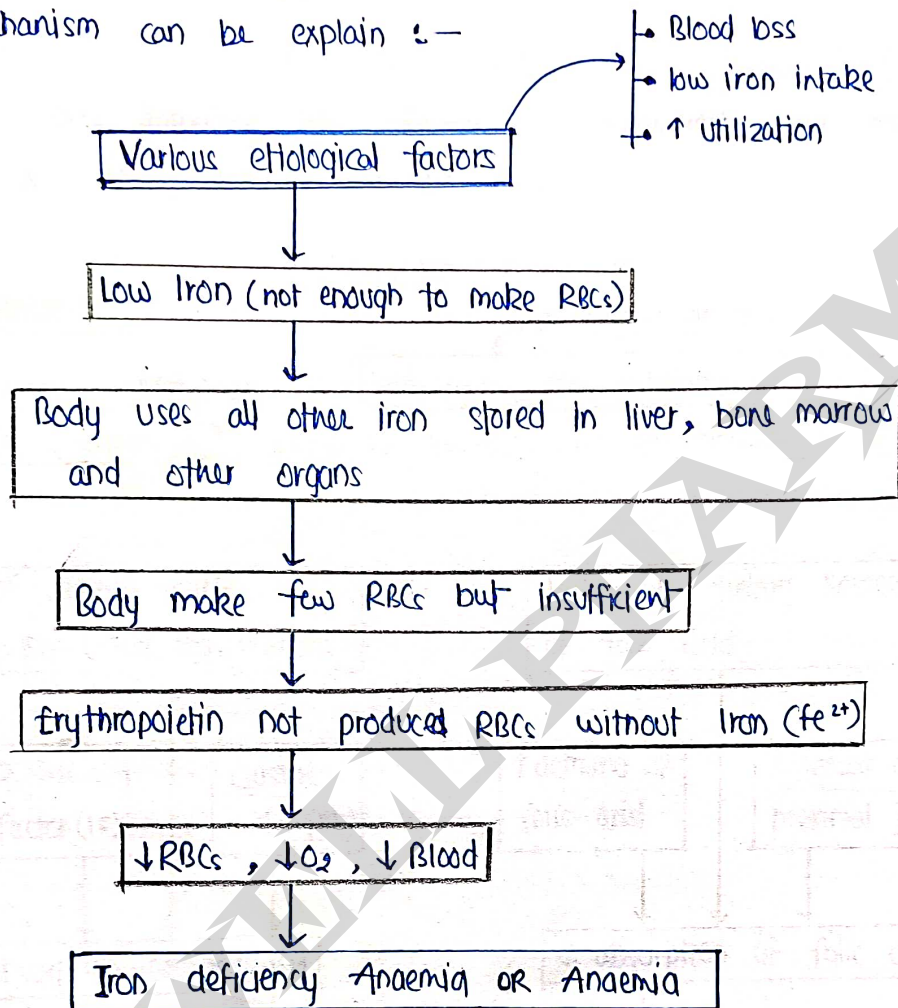
- It is caused due to :
 - Blood loss (due to peptic ulcer, GI bleeding, MC, OTC medicines)
 - Lack of (Iron) in (Diet)
 - Inability to absorb Iron
 - Pregnancy

SIGN AND SYMPTOMS

- | | | |
|------------------------------|-----------------------|---------------------|
| • Extreme fatigue | • Headache, dizziness | • cracks in the |
| • Weakness | • Cold hands and feet | sides of the mouth. |
| • Pale skin | • Poor Appetite | |
| • chest pain, fast heartbeat | • Brittle Nails | |

PATHOGENESIS

- Its mechanism can be explain :-

**COMPLICATIONS**

- Heart problems
- Growth problems
- problems during pregnancy
- Angina (severe level)

TREATMENTS

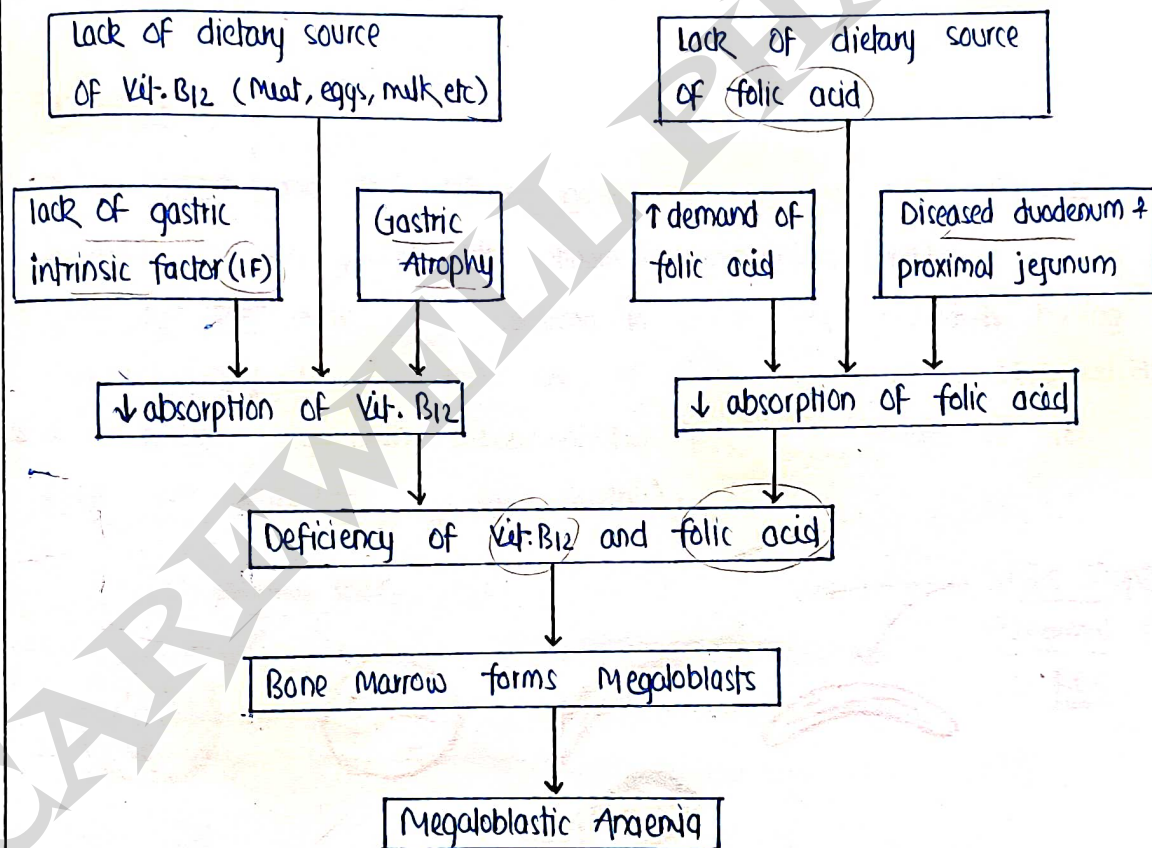
- Iron supplements
- Iron replacement therapy
- Oral formulation of Iron
- Combination of iron with ascorbic acid.

MEGALOBlastic ANEMIA

- It is a condition in which Bone marrow forms large, structurally abnormal and immature RBCs known as megaloblasts and this condition is known as Megaloblastic Anaemia.

PATHOPHYSIOLOGY

- It is mainly caused due to deficiencies of cobalamin (Vitamin B₁₂) or folic acid (Vitamin B₉), which is essential in the formation of RBCs. → pernicious anemia



SYMPTOMS

- fatigue
- Pale skin
- Breathlessness
- Dizziness
- fast/irregular heart beat.

TREATMENTS

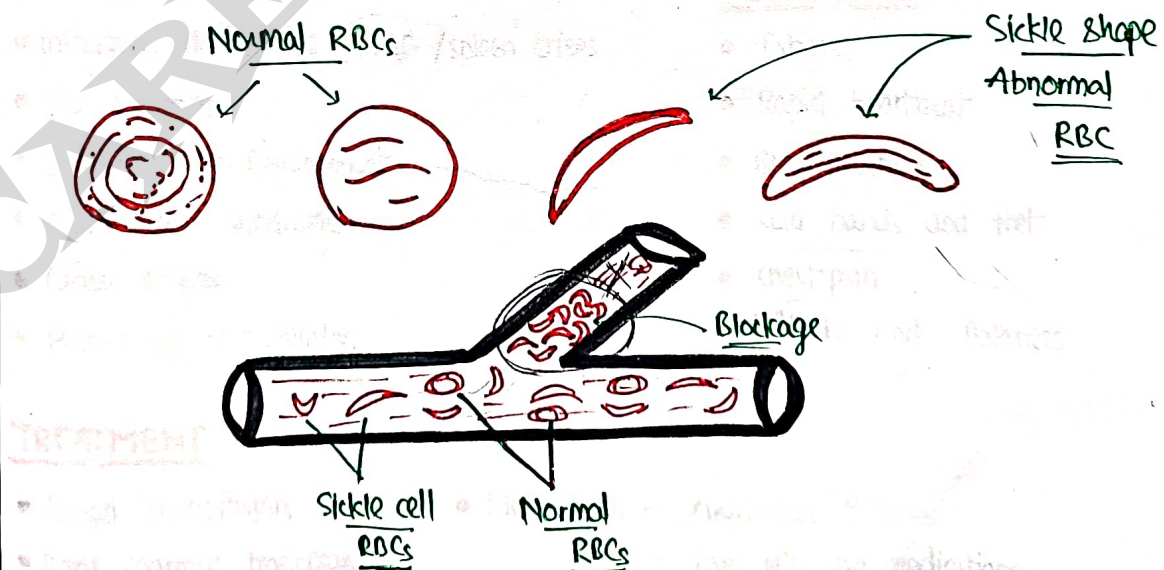
- Oral supplements for Vit. B₁₂ and folic acid.
- ↑ Dietary sources for Vit. B₁₂ / folic acid.

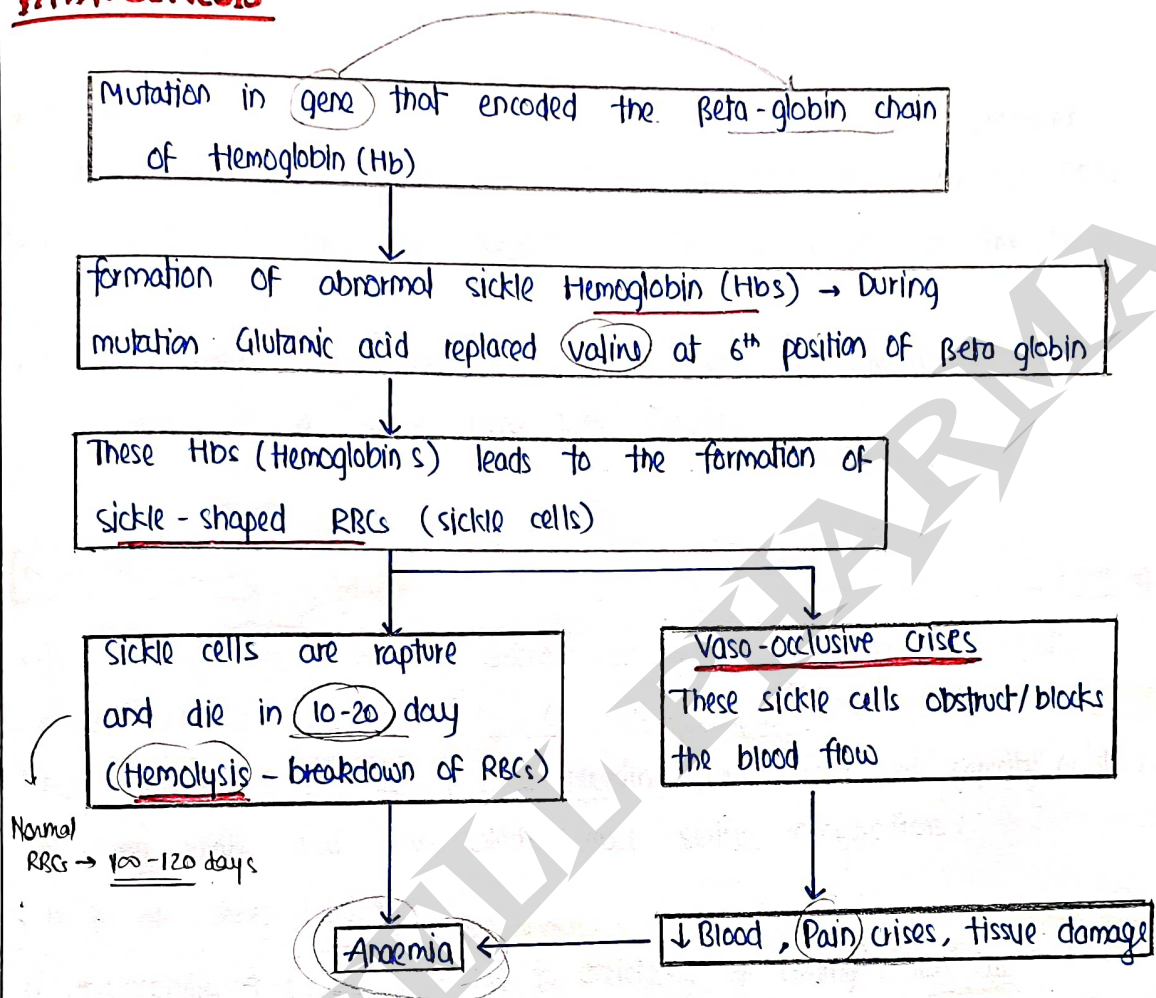
SICKLE CELL ANEMIA — Most Imp

- It is also called as Sickle Cell Disease.
- It is genetic blood disorder/disease in which abnormal hemoglobin (Hbs) causes the RBCs to attain sickle-like shape.
- Now, these sickle-shaped RBCs are rigid and sticky, which blocks the small blood vessels which slow down the blood flow and oxygen. This results in pain and organ damage. It is a life-long disease.
- It is caused when the abnormal Hemoglobin S (Hbs) is passed via genes from parents to their children.

ETIOLOGY

- It is caused due to defected genes in any individuals which is inherited from a parents for abnormal hemoglobin S (Hbs).
- Sickle cell trait → It is a condition in which the individuals having only one copy of the gene are of sickle cell gene and abnormal Hb/RBCs.
- It is occurred only when person/individual inherit two copies of the sickle cell genes (one from each parents).



PATHOGENESIS**COMPLICATIONS**

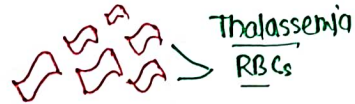
- Infections - damage the (spleen) / spleen crises
- Eye Problem
- ↓ Growth and Development
- Acute Chest Syndrome
- Organ failure
- Pulmonary hypertension

SYMPTOMS

- fatigue
- Rapid heartbeat
- Breathlessness
- Cold hands and feet
- chest pain
- Headache and Paleness

TREATMENT

- Blood Transfusion
- Bone marrow transplant
- Prevent Infections
- Medications - Antibiotics
- Pain-relieving medications

THALASSEMIA

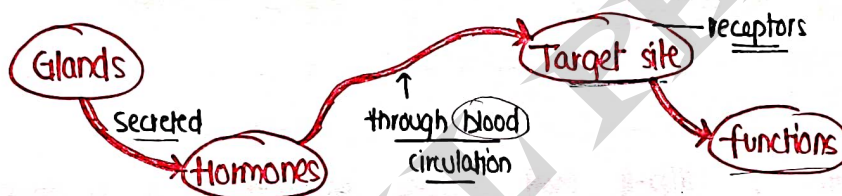
- It is an inherited blood disorder in which the body produces an abnormal hemoglobin which forms abnormal Red blood cells (RBCs).
- This leads to the less number of hemoglobin/RBCs in the blood which leads to anemia.
- It mainly occurs due to mutation in gene of hemoglobin, which is inherited to a person from their parents.

HAEMOPHILIA

- It is an inherited ^{genetic} bleeding disorder in which blood does not clot ^{↓ clotting} properly/normally due to lack of clotting factors. — only cause/etiology
- Due to this, there are internal bleeding, low blood clot capacity or slow, bleeding joints and pain which cause serious complications.
- It is of three types:
 - ① Haemophilia A (classic) → due to deficiency of clotting factor VIII ^{most common} ^{about 90% patients}
 - ② Haemophilia B (Christmas disease) → due to deficiency of clotting factor IX
 - ③ Haemophilia C (Rosenthal's H) → due to deficiency of clotting factor XI

ENDOCRINE SYSTEM

- It is the collection of glands that produce hormones that regulates many physiological functions in body such as growth and development, metabolism, sexual functions and many more.
- Hormones are those substances which is produced by various ~~biological~~ specified cells (glands) in the body and then transported through blood circulation to their target site, where they perform their biological activity.



- Endocrine System Disorders are those conditions, which occurs due to imbalance secretion of hormones.
 - Hyposecretion is a condition of low quantity of hormone secretion
 - Hypersecretion is a condition of overproduction of hormone (↑ quantity).

• Total Glands

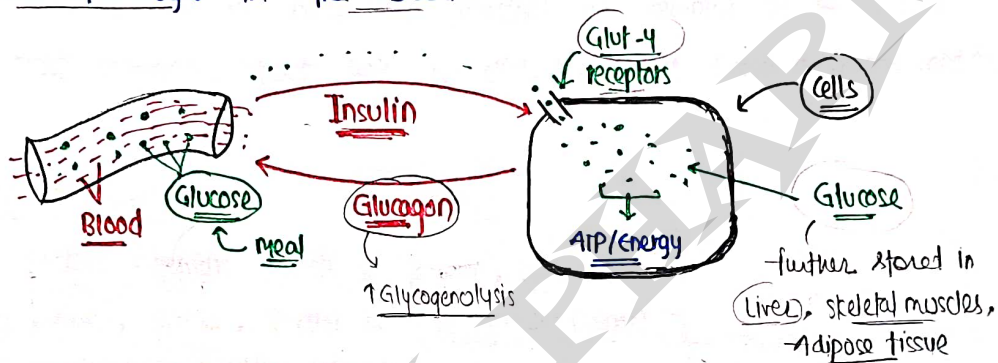
- Pituitary Glands
- Thyroid glands
- Parathyroid
- Adrenal gland
- Pancrease
- Testis
- Ovary

• Disease/Disorder

- Diabetes Mellitus (DM)
- Thyroid disease
- disorders of sex hormones

DIABETES MELLITUS

- It is a metabolic disease in which blood sugar level is high for a prolonged period of time i.e. condition of hyperglycemia.
- It is a serious disease in which a person's body cannot control the level of sugar in the blood.



Insulin → It is a hormone secreted from β -cells of islets of Langerhans of pancreas, which main work is to utilise the glucose present in blood (uptake of glucose).

- In case of Diabetes, Glucose is not utilised by cells causes chronic hyperglycemia (can cause multiple organs) and starvation in cells for energy.
Liver, kidney, nerves

TYPES OF DIABETES

- It is mainly of two types :-

- ① Type I diabetes / Insulin dependent D.M. (IDDM)
- ② Type II diabetes / Non-Insulin dependent D.M. (NIDDM)

① Type I diabetes

- It is also known as Insulin dependent diabetes.
- It is a chronic condition in which the pancreas produce little or no insulin. It is less common, about only 10% cases.

- It is mainly caused due to destruction of β -cells, which produce low or no insulin, so no glucose uptake occurred.
- It may be juvenile-onset disease (begins in childhood) and idiopathy (autoimmunity).

② Type 2 diabetes

- It is also known as Non insulin dependend diabetes
- In this, pancreas make insulin but body cells does not uptake the glucose, may be due to impairment functions of receptor or ~~or~~ insulin.
- It is most common, about 90% of diabetes cases. (also a chronic condition).

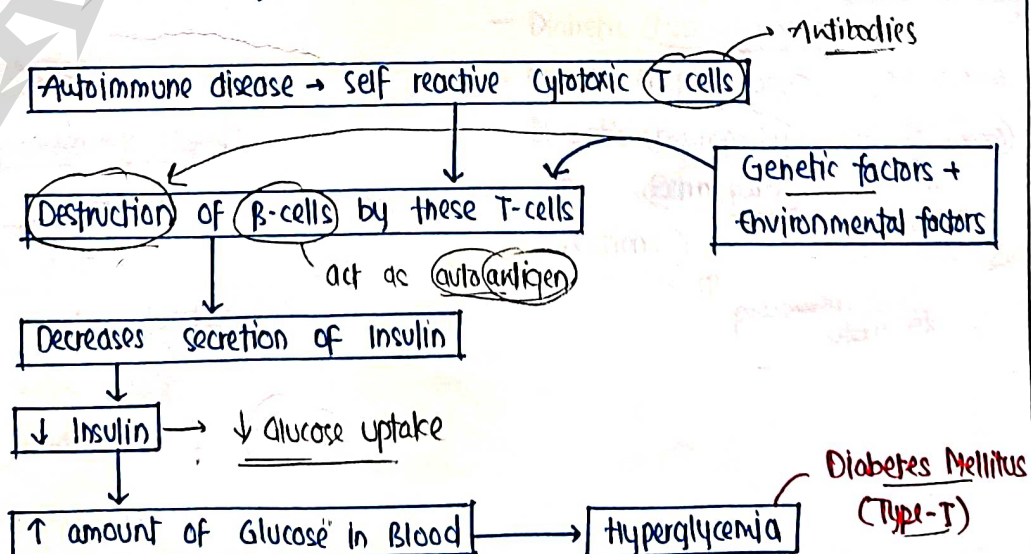
ETIOLOGY OF DIABETES

- Genetic factors (genetic defects in β -cells, mutation etc)
- Obesity, Age, stress, \uparrow diet of carbohydrates (sugar) } Environmental factors
- Alcohol, smoking (unhealthy lifestyles)
- Destruction of β -cells, Injury to pancreas
- Deficiency of insulin synthesis/secretion
- Infections etc \rightarrow Autoimmune disease

PATHOGENESIS

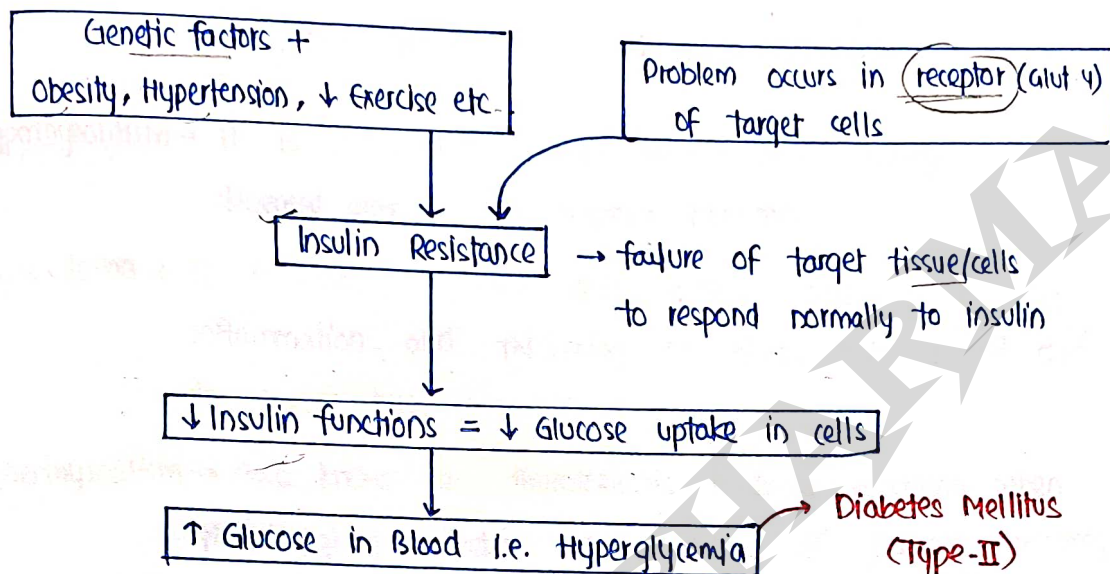
FOR TYPE I DIABETES

- It occurs when body cannot make sufficient/enough insulin.



FOR TYPE II DIABETES

- It occurs when insulin does not perform its functions -

SIGN & SYMPTOMS

- Increases thirst (polydipsia)
- Increases in urination (polyuria)
- Extreme hunger (polyphagia)
- Weight loss
- Extreme fatigue and Headache
- Blurred Vision

TREATMENTS

- Oral hypoglycaemic agents
- Insulin therapy
- Maintain diet
- Exercise, healthy lifestyles
- Avoid sugars, salt
- Weight control etc..

COMPLICATIONS

- Diabetes ketoacidosis → due to continuous loss of glucose in urine
 - Hyperosmolar Non-ketotic coma → due to excessive administration of insulin
 - Hypoglycaemia
 - Long term complications
 - Atherosclerosis → thickening of basement membrane of blood vessels
 - Diabetic microangiopathy
 - Diabetic nephropathy → kidney failure
 - Diabetic neuropathy → injury to neurons
 - " Retinopathy → problem in eyes (glaucoma, night blindness)
 - Infections → TB, pneumonia, ulcers etc..
- Additional notes: "↑ ketone bodies" is written near Diabetes ketoacidosis, and "short term complications" is written near Hypoglycaemia.

THYROID DISEASES

• These are those disease which occurs when there are any abnormality occurs in thyroid gland and their hormones.

Hypothyroidism → It is a condition, when thyroid gland secretes decreased amount of thyroid hormones

Myxoedema → It is rare complicate skin disease which involves the inflammation and thickening of skin. It is caused due to severe hyperthyroidism.

Hyperthyroidism → Also known as thyrotoxicosis. It is a condition, when thyroid gland secretes excess amount of thyroid hormones.

Graves' disease → It is immune system disorder which leads to overproduction of thyroid hormones (overactive thyroid)

Cretin → It is a condition, in which the thyroid gland enlarges abnormally. It is due to lack of dietary iodine.

DISORDERS OF SEX HORMONES

• Those disorders which occurs due to imbalance in sex hormones.

Polycystic Ovary Syndrome (PCOS) → It is hormonal disorder, which mainly affects the levels of sex hormones. It mainly affects the irregular or prolonged menstrual periods, excess male hormones, follicles on ovaries, failed to release eggs.

Hirsutism → It is a condition in which unwanted, dark and rough hair grows on the face, back and chest of women due to excess/abnormal

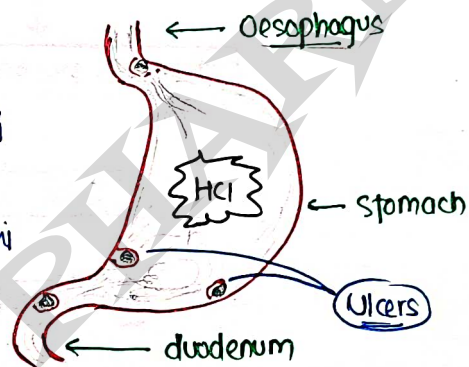
Erectile dysfunction (ED) → It is a condition in which males are unable/fails to achieve the erection (occurs due to lack of ^{male} hormones. _{androgen and} blood in penis)

Gynecomastia → It is a condition of benign enlargement of male breast due to proliferation of its glandular components. It may be due to low level of testosterone (as compared to oestrogen).

PEPTIC ULCER

- Peptic Ulcers are open ^{and} sores that develop in the inside lining of the oesophagus, stomach and duodenum (upper portion of small intestine) due to increase level of acid
- It is of three types :

- (i) Gastric Ulcer → Ulcer in stomach due to
↓ defective factors + H. Pylori
- (ii) Duodenal Ulcer → Ulcer in duodenum due to
↑ aggressive factors + H. Pylori
- (iii) Oesophageal Ulcer → Ulcer in oesophagus,
due to reflex activity



- Peptic ulcer is managed by balance between aggressive and the defensive factors.
- Peptic ulcer caused due to imbalance b/w these two types of factors.

ETIOLOGY

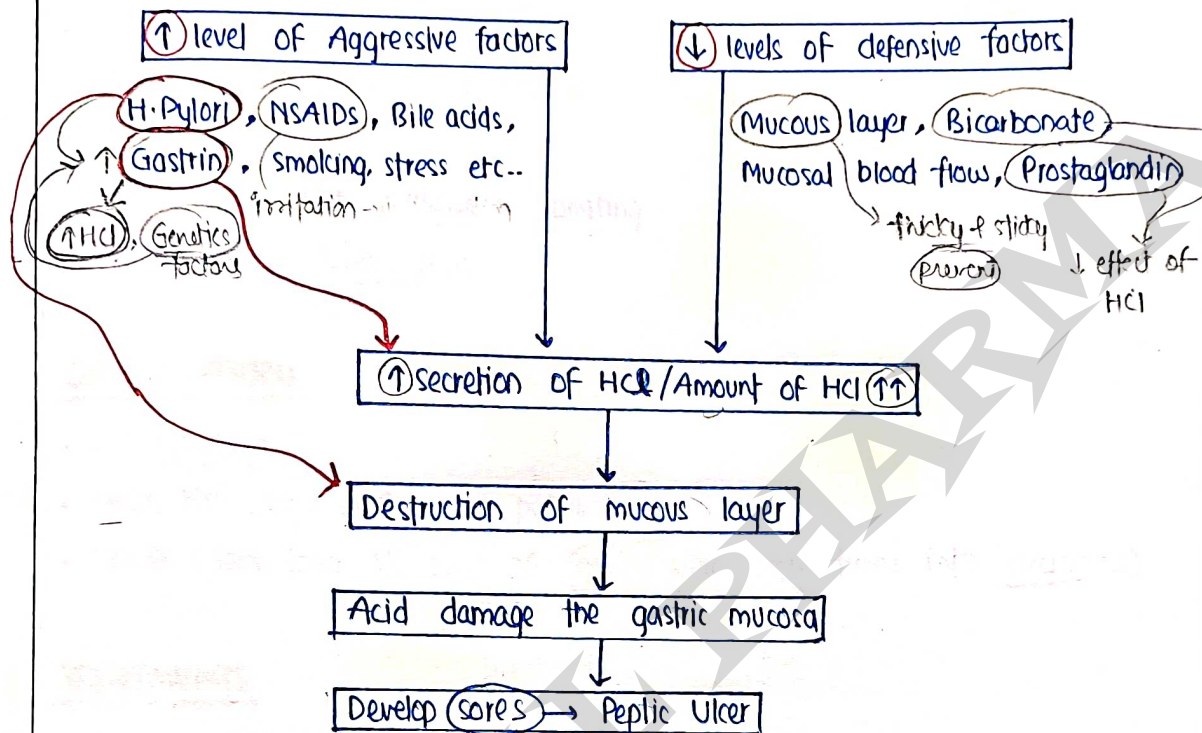
- H. Pylori → infect stomach, causing inflammation, (↑ HCl)
- NSAIDs → Aspirin, ibuprofen increases the risk
- Genetic factors → Zollinger-Ellison syndrome
- Smoking, stress, Alcohols
- Radiotherapy
- Cancer of stomach

AGGRESSIVE FACTORS (↑) =

- Acids (HCl)
- Pepsin
- Bile acid
- Gastrin
- H. Pylori

DEFENSIVE FACTORS (↓)

- Gastric mucus
- Bicarbonate
- Prostaglandin
- Nitric Oxide (N.O.)

PATHOGENESIS

- Peptic ulcer occurs, where there is imbalance b/w these factors

H. Pylori ^{Bacteria} → Helicobacter pylori mainly found in gastric/duodenal mucosa.

- It increases the pH (Basic) → damage local region of mucosa
- It increases the Gastrin release → ↑ secretion of HCl → Ulcers

NSAIDs → ↓ activity of prostaglandin, irritation in lining of GIT.

Genetics → Zollinger-Ellison syndrome (cause tumors as gastrinomas) which increase secretion of Gastrin → release HCl → Ulcers.

Mucosa, Bicarbonate, Prostaglandins → they have preventive nature, but decrease in their amount can lead to increase the effect of HCl → which cause ulcers--

SYMPTOMS

- Stomach pain / burning pain (most common)
- Less common →
Heartburn, Bloating, Nausea, Vomiting
- Severe symptoms →
Dark or black (stool), Blood in Vomiting
Weight loss, Severe pain

COMPLICATIONS

- Haemorrhage
- Obstruction (ulcer develop near pylorus)
- Cancer (less than 1% cases of gastric ulcers may turn into carcinoma)

TREATMENTS

- Healthy diets (avoid acidic foods)
- Prevent unwanted / more uses of NSAIDs
- Healthy lifestyles (avoid smoking, stress)
- ↑ exercise
- Medications:
 - Antibiotics Anti H. pylori drug
 - Antacids
 - Acid suppressors etc...

SYMPTOMS

- Seizures
- Uncontrolled jerking
- Loss of awareness
- Nausea, vomiting, dizziness, sweating, blurred vision
- Temporary loss of consciousness
- Headache and fatigue after seizure

NERVOUS SYSTEM

- It control and coordinate the human body and it gives the quick response to our body.
- Nervous system is made up from highly specialised cells i.e. Neurons + Neuroglial cells
- Problem related/occured in Nervous System:
 - (i) Epilepsy
 - (ii) Parkinson's disease
 - (iii) Stroke
 - (iv) Psychiatric disorders → Depression, Schizophrenia and Alzheimer's disease.

EPILEPSY

- Epilepsy is a group of disorders of brain, which mainly leads to periodic and unpredictable occurrence of seizures.
- According to WHO,

Epilepsy is a condition having a tendency for recurrent ^{(2) or more} seizures, due to disorder of brain cells.
- Seizures ^{convulsions} are uncontrolled jerking, loss of consciousness and disturbance of sensation, movement, behaviour, perception due to excessive and temporary neuronal discharge (leads to abnormal electrical activity).
- These disorder comes under paroxysmal cerebral dysrhythmia.

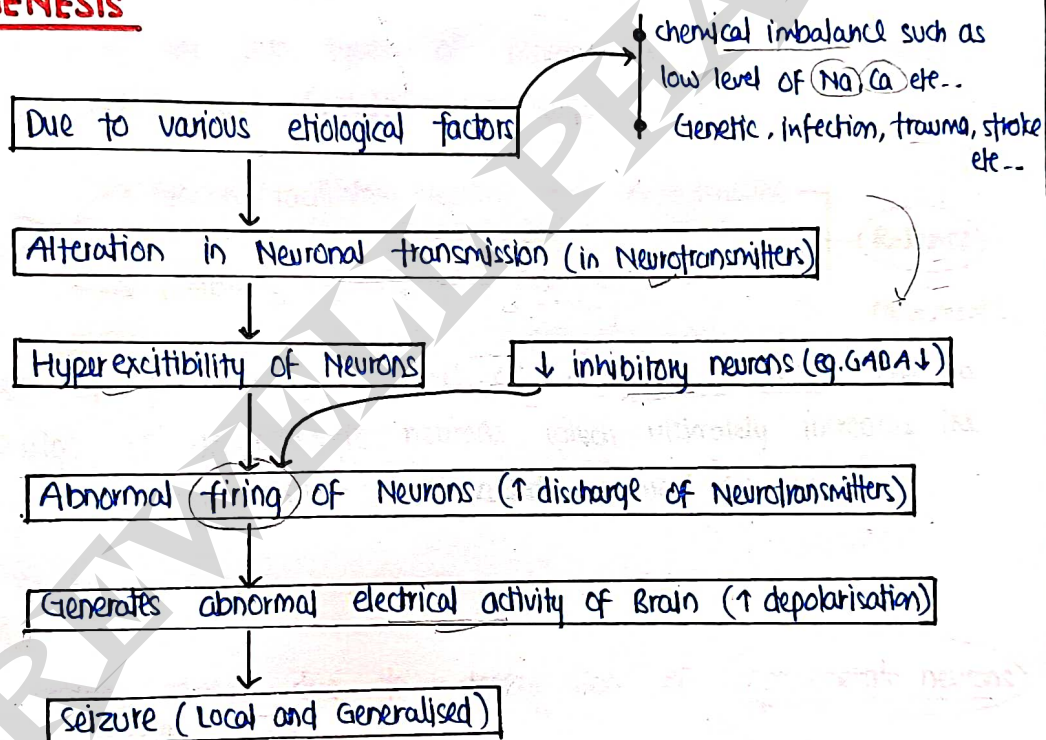
SYMPTOMS

- Seizures
- loss of consciousness
- Temporary confusion
- uncontrolled jerking
- Nausea, vomiting, sweating, flushing, dizziness, depression and anger etc~

ETIOLOGY

- It is caused due to abnormal and excessive discharge of neuron in the brain, which leads to increases electric activity and generate seizures.
- It may be caused due to :-
 - Genetic factors (from parents)
 - Head trauma (due to any type of accident & trauma)
 - Brain damage (due to tumours/stroke)
 - Infectious disease (Meningitis, AIDS, Viral encephalitis etc..)

PATHOGENESIS



TYPES

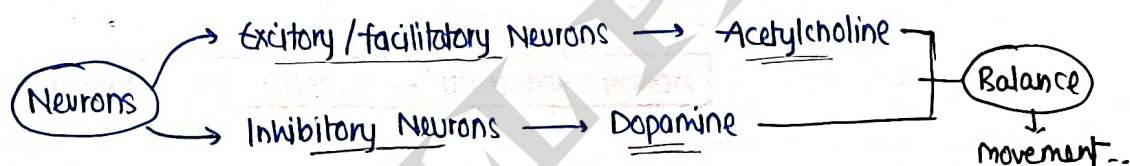
- ① Partial seizures → These are local/focal seizure in which excessive neuronal discharge begins locally and remains localised.
It includes involuntary muscle contraction, abnormal senses, or effects on mood and behaviours.
- ② Generalised seizures → In this, the whole brain is involved including Reticular System. In this, ↑ discharge and electrical activity in whole brain results in immediate loss of consciousness.

PARKINSON'S DISEASE

- It is a chronic neurodegenerative disorder of nervous system, which is categorised as movement disorder due to insufficiency of dopamine.
- In 1817, James parkinson find it as a movement disorder that's why its name is parkinson's disease.
- Generally, it affects the elderly

Basic mechanism

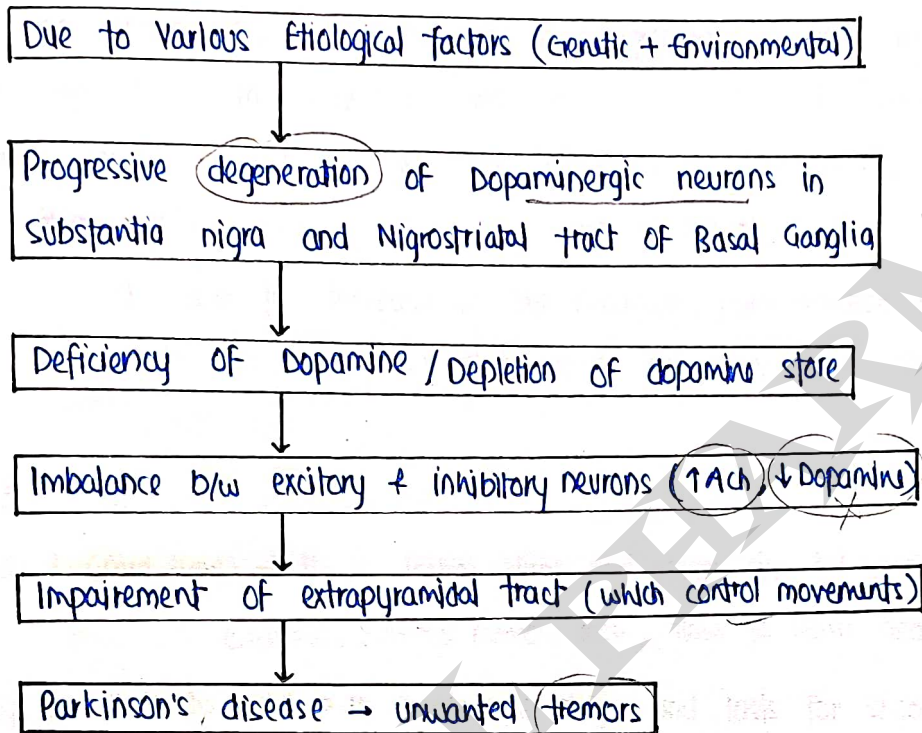
- Generally there are two types of neurons in our body, which maintain balance and facilitates movements.



- In case of parkinson, the level of dopamine decreases due to degeneration of dopaminergic neurons, which ultimately increases the level of acetylcholine leads to unwanted movement (tremor).

ETIOLOGY

- It is mainly caused due to degeneration of dopaminergic neurons in basal ganglia - control movements
- It can be caused due to:
 - Genetic factors
 - Environmental factors such as Age, sex, dietary habits, infections, toxins etc.
 - Head trauma
 - Neoplasm (tumor)
 - Atherosclerosis

PATHOGENESIS**SIGN & SYMPTOMS**

- Tremors (shaking)
- Bradykinesia (slow movement)
- Muscle rigidity (stiff)
- Abnormal posture
- Restless leg syndrome ^{urge to move legs}
- Loss of automatic movements
- Loss of sense of smell
- Pain, mood / sleep disorder

COMPLICATIONS

- Depression
- Anxiety ^{impairment in memory, thinking & social abilities.}
- Dementia
- Behavioural disturbance
- Apathy ^{lack of interest, emotion, motivation}
- Dysphagia ^{difficulty in swallowing}
- Sleep disorders
- Sexual dysfunction etc..

TREATMENT

- Physical therapy such as PWSTT (~~Partial~~ Partial weight supported Treadmill Gait-training) + Wireless Vibratory feedback system
- Dopamine precursor
- Dopamine facilitator
- Dopaminergic Agonists etc..

ALZHEIMER'S DISEASE

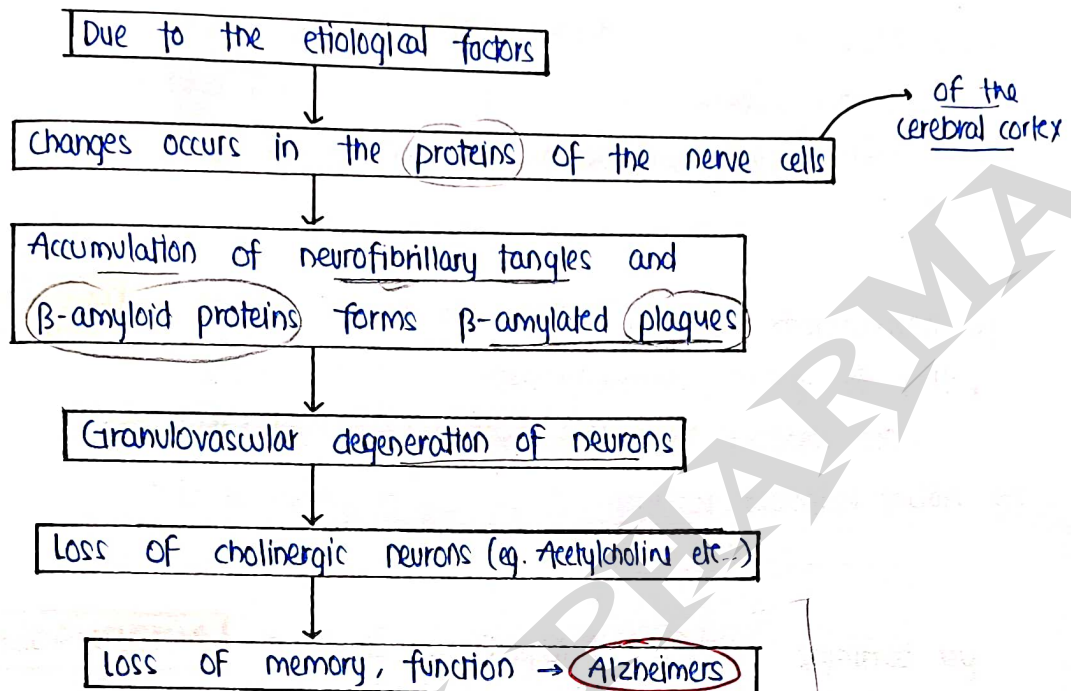
- It is an irreversible, progressive and neurodegenerative disease in which severe impairment in cognitive and functional ability of patients.
- In this, patients slowly lose their memory, thinking ability and to perform easiest task.
 → leads to dementia.
- It is caused due to increase in the production / accumulation of β -amyloid proteins in the brain that leads to nerve cell death.

TYPES

- ① Stage 1 (Mild type) → It is initial stage and lasts for 2-4 years. Patients feels less energetics, minor memory loss, slow to learn and react.
- ② Stage 2 (Moderate type) → It is longest stage and lasts for 2-10 years. Patients feels symptoms like forget recent events, personal history, become disabled, difficulty in speech, reading and writing.
- ③ Stage 3 (Severe type) → It is last and severe stage. In this, Patients may lose the ability to feed themselves, impaired speech, uncontrolled body functions.
 (bladder control)

ETIOLOGY

- The exact causes are not known, but these may be a causes
- Deficiency of ~~neurologi~~ neurochemical agents (Acetylcholin, Norepinephrine, Somastatin, Substana P)
- Genetic factors (family history)
- Advancing Age
- Trauma (accident)
- Other disease (vascular disease, diabetes, hypertension, stroke)
- ↑ fat, obesity
- Smoking

PATHOGENESIS**SYMPTOMS**

- Memory loss
- forgetfulness / absent mindedness
- feeling confused
- Depression
- weakened vision
- Aggressiveness

COMPLICATIONS

- Aspiration (inhaling food/liquids into lungs)
- Pneumonia and other infections
- fractures
- (Bedsore) injury to skin/tissue (pressure ulcer)
- Malnutrition or dehydration

TREATMENT

- To maximise the patient's ability to function in daily life.
- Maintenance of quality of life.
- Avoids → alcohol, sedatives, Antihistamines
- Treatment and management of cognitive (thinking, memory + perception).
- Cholinesterase inhibitors
- Glutamate Agents

STROKE

→ It is a life-threatening condition that occurs when brain does not get enough amount of blood flow.

- Also known as cerebrovascular accident (CVA).
- It occurs due to occlusion/rupturing of blood vessels (haemorrhaging).

DEPRESSION

→ It is a common mental disorder, characterised by sadness, loss of interest/pleasure, feelings of guilt, disturbed sleep/appetite, feeling of tiredness etc..

- It is mainly caused due to genetical, biological factors etc..

SCHIZOPHRENIA

→ It is a psychotic condition signified by loss of contact with the reality.

- It is mental disorder which includes extreme imaginary thinking, behaviour, hallucinations and delusions thoughts.