

Control n coordination

14 May 2023 09:38

- ⇒ In unicellular eukaryotes - organism respond to stimuli either moving towards or away from the source of stimulus.
 - This termed is known as Taxis.
- ⇒ In higher animals. — [Nervous system
Endocrine system.

Nervous system

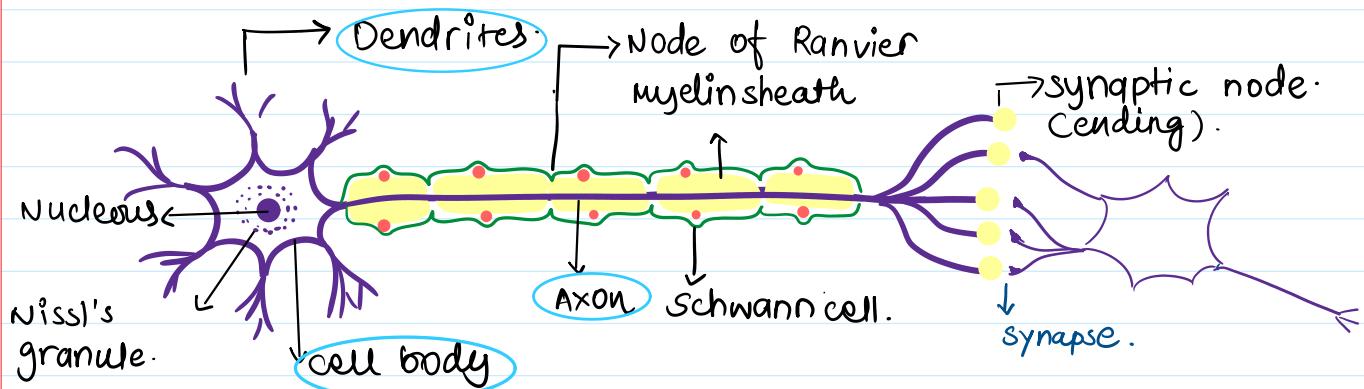
→ Nervous system consists of highly specialized cells **Neurons**

Neurons form a network → conduct information via electrical impulse. It controls voluntary activities & regulates involuntary activities

Terms of Nervous system

Stimulus Response Receptor Impulse Effector.

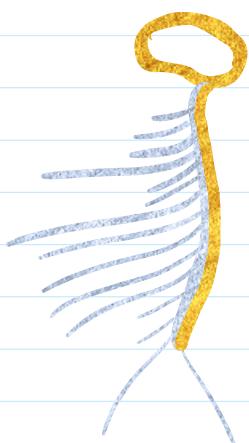
⇒ Nerve cell formed from neuroblast. It is the longest cell.



Vertebrate Nervous system.

CNS

Brain



Spinal cord.

CNS.
PNS.

Relay/connector/
Inter neurons.

cranial Nerves

- Arise from the Brain

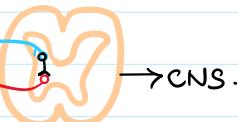
spinal Nerves

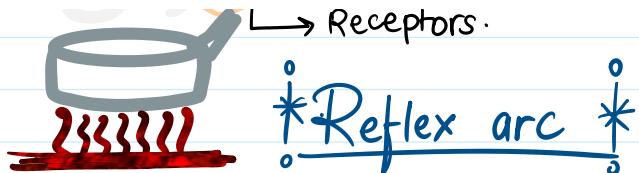
- Arise from the spinal cord.

Sensory
Nerve



Motor nerve.

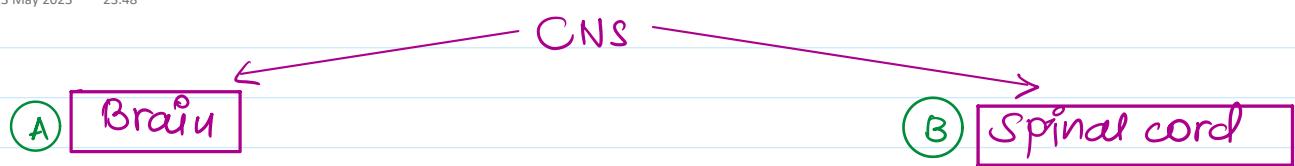




Sensory Neuron :- . sense organ (Receptor) → CNS. (Brain & spinal cord).

or Inter neurons :- occurs in CNS → connector of sensory & motor neurons

Motor Neuron :- CNS → (effectors.) (Muscles & gland).

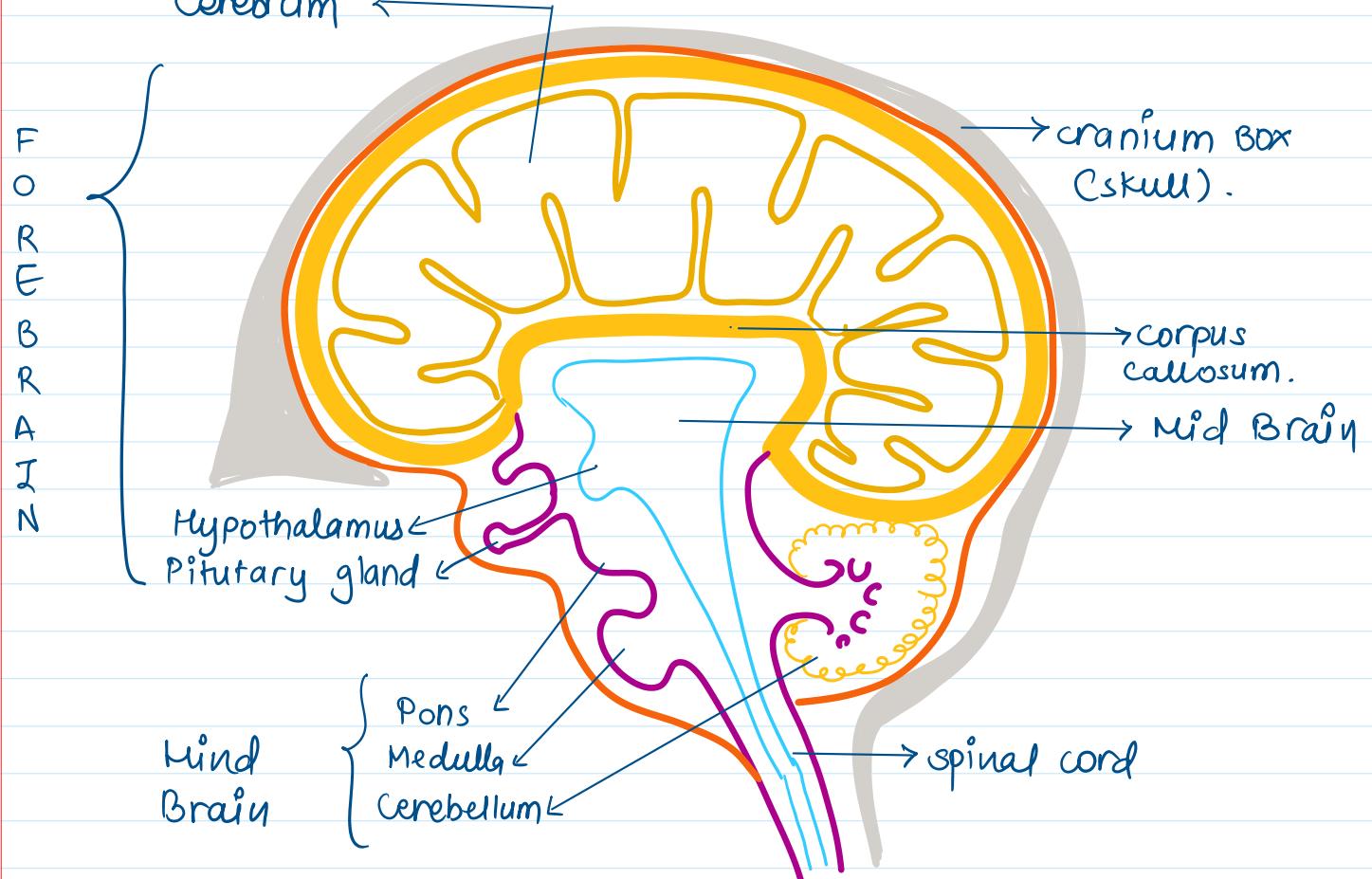


(A) Brain Anatomy :-

→ Brain consist of mainly three parts :-

- 1) Fore Brain
- 2) Mid Brain
- 3) Hind Brain

Cerebrum ←



(1) Fore Brain :- Most complex or specialized part of the brain.

It consist of cerebrum, olfactory lobes & Diencephalon.

- It response against the appropriate approach
- Respond to Hearing, smell, sight.

1. Olfactory lobes :-

- Smell → Part: Nose

2. cerebrum :-

- largest part of Brain
- 2 Hemisphere are there.

- largest part of Brain
- 2 Hemisphere are there.

Function:-

- Thinking, Reasoning out, Invention, Planning, Memorise.
- Intelligence & consciousness.

Respond to Voluntary actions

3. Diencephalon :-

Thalamus.

→ station to the motor & sensory signal to cortex

Hypothalamus

→ Respond to Involuntary actions

- Hormonal gland
- Work on thirst, Hunger, Body temperature, sexual desires.

Body temperature

- Regulate
 - Mechanism:-
- Thermostat mechanism**
- Thus, it is known as thermoregulatory centers.

Releasing & Inhibition of hormones.

- Important link between endocrine system & Nervous system.

(2) Mid Brain :- Controls Involuntary actions.

- change in pupil size.
- Reflex movements of head, neck & trunk.
- It is covered by the cerebral Hemisphere.
- Sight & Hearing Reflexes.

(3) Hind Brain :- It consist mainly three parts -

(1) cerebellum

- Second largest part of Brain
- Little Brain.
- present below the cerebrum, above the medulla oblongata & behind the pons.
- Regulates Voluntary actions
 - Movement of Body.
 - Maintenance of equilibrium
 - Posture of body. Walk, ride, picking up the pencil.
- cerebellum modifies the voluntary movements initiated

- Posture of body. (Walk, ride, picking up the pencil).
- cerebellum modifies the voluntary movements initiated by cerebrum.

(2) Pons :-

- present in front of cerebellum
- It functions to regulate the respiration with the help of medulla oblongata.

(3) Medulla Oblongata :-

- Having numerous centres of body to regulate.

Such as :-

1. Cardiac centre (Heart Beat)
2. Respiratory centre (Rate of Respiration)
3. Vomotor centre (Contraction of blood vessels)
4. Salivary centre. (secretion of saliva).

Involuntary actions are:-

- sneezing, coughing, vomiting, urination, Blood pressure, gut peristalsis, swallowing etc.

B spinal cord

- long, soft, whitish, cylindrical rod present in the neural canal of vertebral column.
- extends from  **Medulla Oblongata**

Neural canal

- conducts sensory & motor impulses
- controls the reflex actions. of the body.

→ Comprises of all the nerves of the body associated with the CNS. (Brain & spinal cord).

- 12 pairs of - Cranial Nerves (Arises from brain)
- 31 pairs of - spinal Nerves (Arises from spinal cord)

PNS

Somatic Neural system

→ CNS → skeletal muscles.

Automatic Neural system.

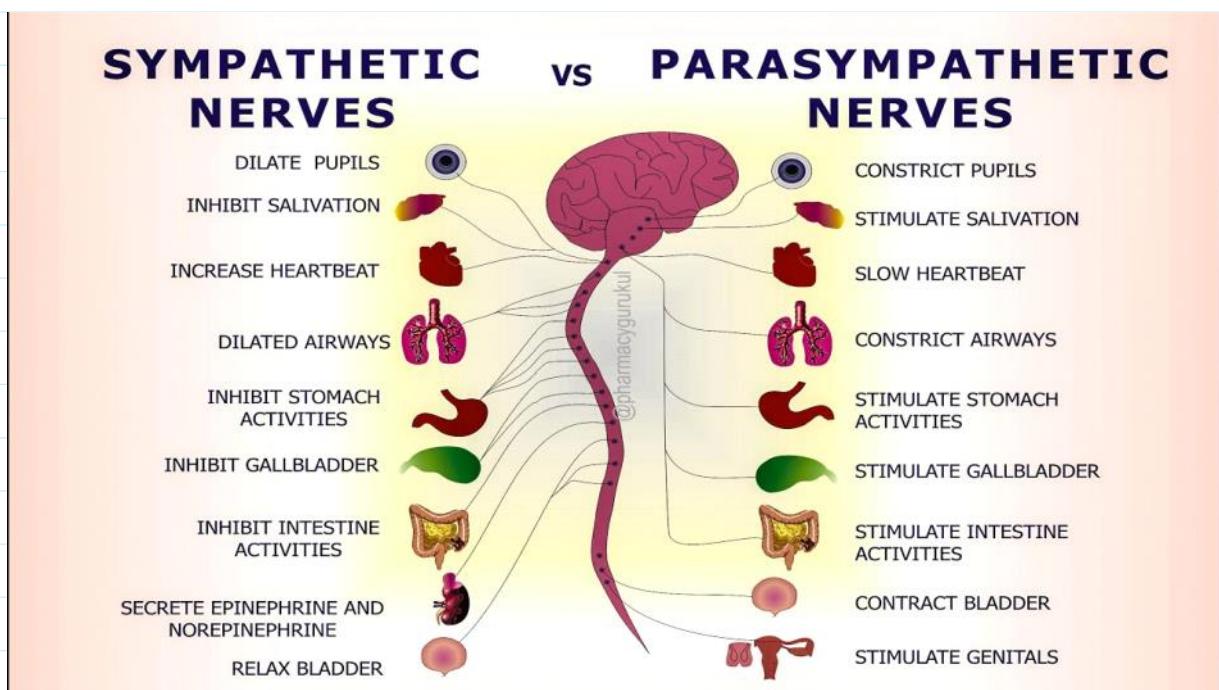
→ CNS → Involuntary organ & smooth muscles of body.

Sympathetic Nervous system

- Prepares the body for violent action against abnormal conditions.

Parasympathetic Nervous system.

- Concerned with re-establishing normal conditions after the violent act is over.



⇒ Both are antagonistic to each other.

Coordination in plants.

→ Classified into two types on the basis of direction of response to a stimulus.

Nastic Movement ← → Tropic Movement.

(1) Nastic Movement :- Non directional movement caused by turgor changes.

Decrease in turgor pressure ↓ change in osmotic potential → Increase in turgor pressure causes swelling

Causes shrinkage

Example:- *Mimosa pudica* (touch me not plant).

It shows → Nyctinasty. (Sleep movement)

Seismonasty (shock movement).

→ Due to such changes the leaves of this plant get drooped.

Nastic Movements.

Autonomic

Internal stimuli

Paratonic

External stimuli.

Hydronasty

Thigmonasty

Chemonasty

Nyctinasty

Seismonasty

(2) Tropic Movement :- Directional movements brought by more growth on one side and less growth on opposite side.

- Induced by some external stimuli

- It happens due to the action of plant hormones.

(1) Phototropism :- Response Determined by the direction of light

Ex:- Sunflower :- Flower : Positively phototropic

Stem : Positively phototropic

Root : Negatively phototropic.

(2) Geotropism :- Caused by unilateral exposure to the force of gravity

Ex:- Main Root :- Positively geotropic

Main stem :- Negatively geotropic

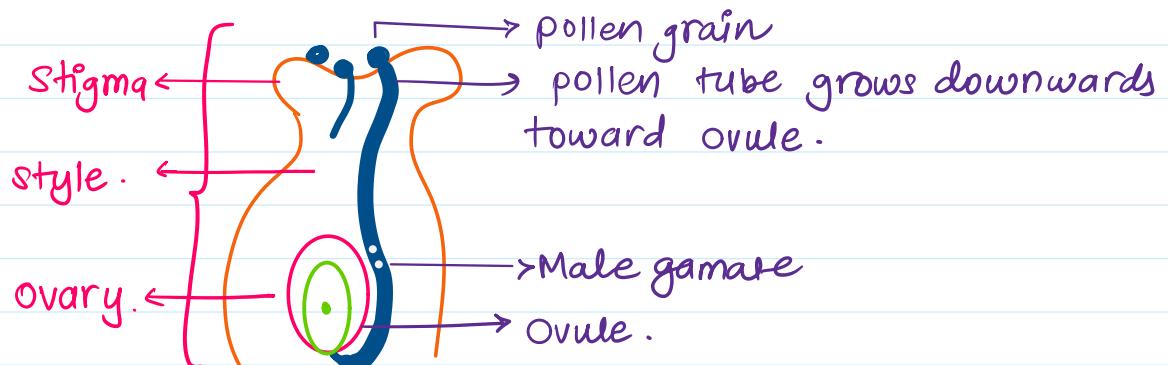
(3) Hydrotroism :- induced by unilateral stimulus of water
Ex:- Roots:- positively hydrotropic.

(4) Thigmotropism :- Occur in response to stimulus of contact
Ex:- pea plant climb to the fence or other plants by tendrils which are sensitive to touch.

- Tendrils grows faster as it came in contact with object due to the diffusion of more auxin from its site of synthesis towards the side of tendrils.
- which circle around the object and cling to it.

(5) chemotropism :- These are induced by unidirectional stimulus of chemicals

Ex:- growth of pollen tube towards ovule.



Response of a "pollen" to chemicals secreted by stigma

Plant hormone

18 May 2023 12:49

Hormone	Where Produced or Found in Plant	Major Functions
Auxin (IAA)	Embryo of seed, meristems of apical buds, young leaves	Stimulates stem elongation (low concentration only), root growth, cell differentiation, and branching; regulates development of fruit; enhances apical dominance; functions in phototropism and gravitropism; promotes xylem differentiation; retards leaf abscission
Cytokinins	Synthesized in roots and transported to other organs	Affect root growth and differentiation; stimulate cell division and growth; stimulate germination; delay senescence
Gibberellins	Meristems of apical buds and roots, young leaves, embryo	Promote seed and bud germination, stem elongation, and leaf growth; stimulate flowering and development of fruit; affect root growth and differentiation
Abscisic acid	Leaves, stems, roots, green fruit	Inhibits growth; closes stomata during water stress; promotes seed dormancy
Ethylene	Tissues of ripening fruit, nodes of stems, aging leaves and flowers	Promotes fruit ripening, opposes some auxin effects; promotes or inhibits growth and development of roots, leaves, and flowers, depending on species

→ In most multicellular organism if fast responses to stimuli are to be made, then the transmission of information must happen very quickly.

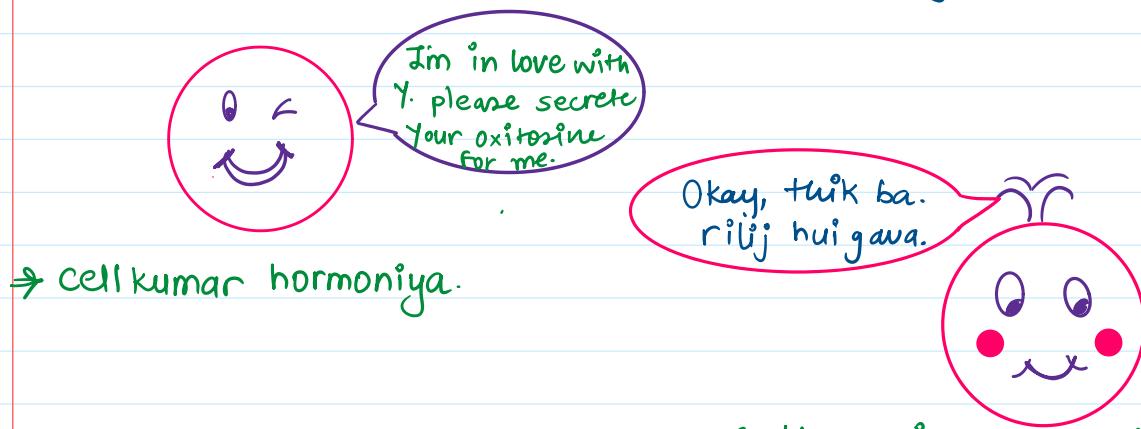
- There are some limitations & drawbacks also associated.

(1) In animal Body, these will not reach each and every cell rather these will reach only those cells that are connected by nervous tissue.

(2) After the generation & transmission of an electrical impulse the cell takes some time to reset its mechanism for the generation & transmission of a new impulse

Thus, most multicellular organism use another means of communication between cells known as "chemical communication."

↳ In this, stimulated cells release a chemical compound, which diffuses all around the original cell.



→ Cell Kumar Surface Molecule wala

→ These chemical compounds are known as **hormones** and are synthesised at places away from where they act and simply diffuse.

→ endocrine association → Endocrine system.

→ Hormone (chemical messenger) → "To set in motion or to excite"

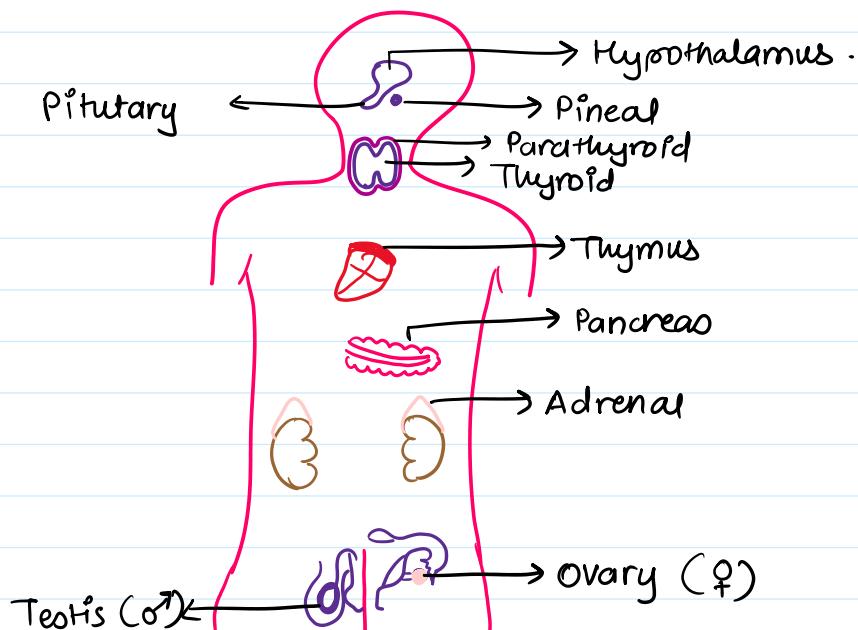
→ Thomas Addison → "Father of Endocrinology.".

* General properties of Hormones:-

- Secreted by endocrine gland & released directly into the blood.
- Act on target organs & cells usually away from sources.
- Hormones produced in 1 species usually show similar effect in other species.

- Hormones produced in 1 species usually show similar effect in other species.
- Produced in very small quantities & biologically very active.
- chemically, peptides. - Insulin
Amines, - Adrenaline (Derived from A.A.) } Water soluble.
⇒ steroids - Progesterone } Lipid soluble.
- Their excess (Hyper secretion) } leads to serious
Deficiency (Hypo secretion) } consequences.

- Hormones are chemical substances which coordinate the activities of living organisms & also their growth.
- Endocrine glands:- These glands secrete their product (hormone) into the blood.



(1) Hypothalamus:-

- Releasing Hormone (Mid brain) - stimulates pituitary glands.
- Inhibitory Releasing Hormone
- GnRH - Gonadotropin Releasing Hormone
 - ↳ Stimulates pituitary to synthesis & release of gonadotropin
- Somatostatin
 - ↳ Inhibits → GH of pituitary.

⇒ Hormones of this gland actives the pituitary gland.

(2) Pituitary gland

Adenohypophysis

Pars distalis

(Anterior p.g.)

- Growth Hormone

- Prolactin

- Thyroid stimulating Hormone

- Adrenocorticotrophic

Pars intermedia

- Melanocyte stimulating Hormone.

Neurohypophysis

Pars Nervosa

(Posterior p.g.)

- Oxytocin

- Vasopressin

Synthesised
By hypothalamus
& transported here.

Hormone

- Adrenocorticotropic Hormone
- Follicle stimulating Hormone.

By hypothalamus & transported here.

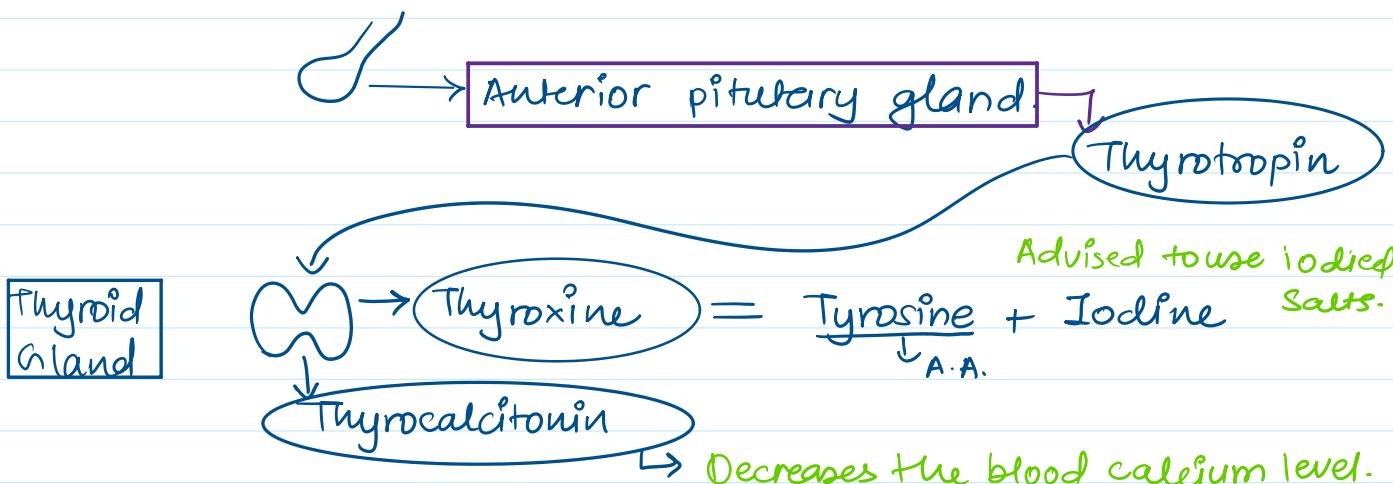
→ Anti-diuretic Hormone.

→ Growth hormone or somatotropin:-

- Dwarfism:- Deficiency of growth hormone.
- Gigantism:- Excessive secretion of growth hormone from early age.
- Acromegaly:- Over secretion of GH. characterised by disproportionate increase in size of bones of face, hands & feet.

(3) Thyroid hormone:- largest endocrine gland.

→ Secretes thyroxine hormone.



→ Functions:-

- controls BMR. (Burn calories, when resting through basic life sustaining process).
- Regulates carbohydrates, protein and fat metabolism in the body to provide the best balance for growth.
- It maintains the body temperature.
- It controls muscular & nervous activity.
- It controls mental & sexual development.

→ Disorder:-

Simple Goitre:- Due to lack of iodine in our diet & the symptoms are swollen neck. Quite common in northern hilly areas.

(4) Parathyroid gland:-

→ Four small sized glands situated on the posterior surface of thyroid gland

- Four small sized glands situated on the posterior surface of thyroid gland.
- secretes Parathyroid Hormone (PTH).
 - Increases the blood calcium level

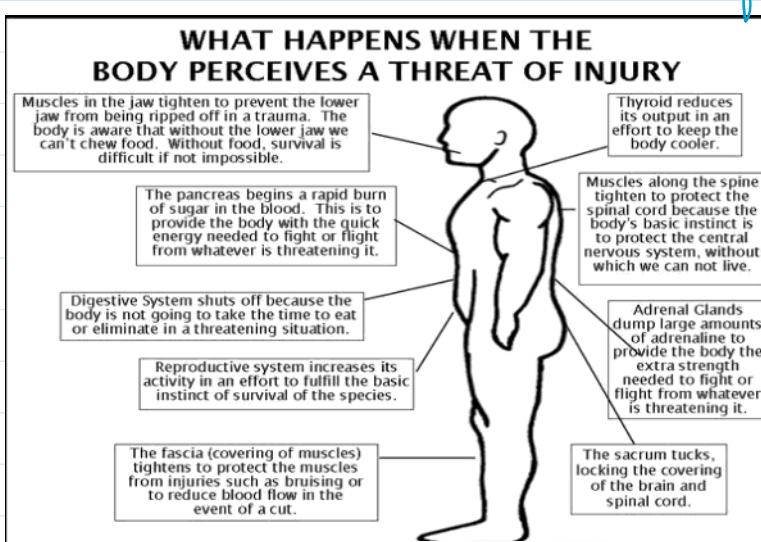
(5) Thymus gland :-

- Location :- Upper anterior part of chest, behind sternum & between lungs.
- produces thymosine
 - It stimulates the development of antibodies.
 - Produces T-lymphocytes (type of WBC that fight infections & destroy abnormal cells).

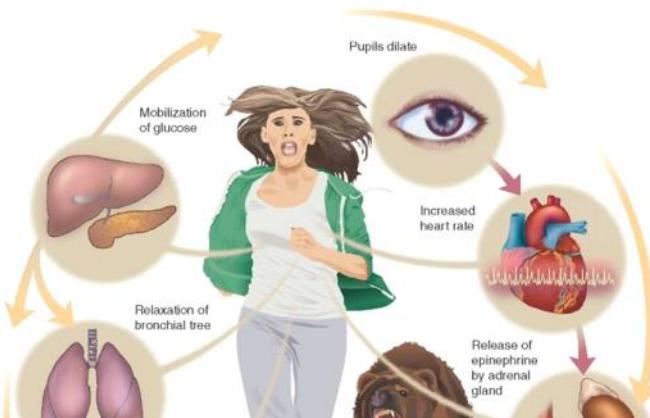
(6) Adrenal gland :-

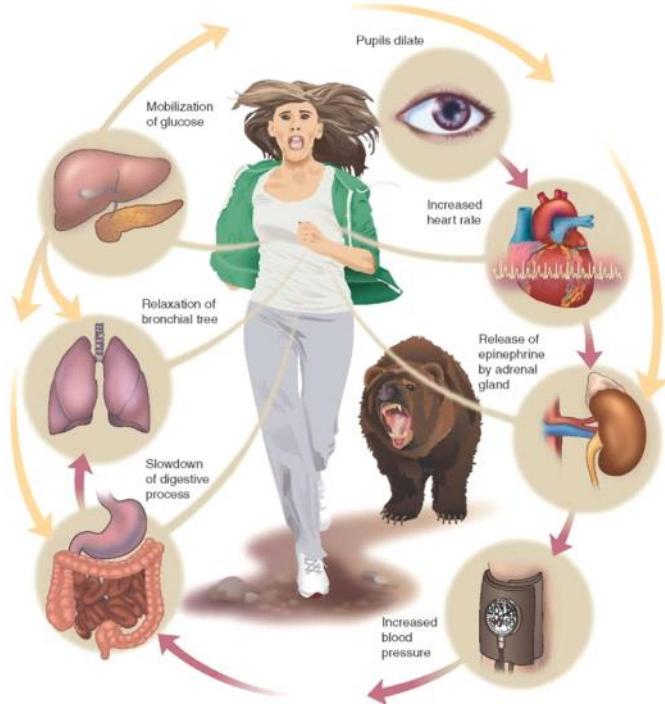
- Location :- paired structures on the top of kidneys.
- two parts of Adrenal gland :- Medulla :- Middle cortex :- Outer.
- Medulla Hormone :- AKA Emergency Hormones.

Epinephrine / Adrenaline } These hormones also prepare
 Norepinephrine / Noradrenaline } the body during the flight, fight & fight.



FST 2T
 HQT !!





(f) Pancreas :-

- lies inferior to the stomach in a bend of the stomach.
- It is both endocrine gland :- Hormones (Insulin & glucagon)
exocrine gland :- Pancreatic juice
Endocrine Hormones

↓ Insulin

1. → Promotes glucose utilisation by the body cells.
- lowers the blood glucose level.
2. → stimulates deposition of extra glucose in blood as glycogen in liver and muscles.
- Hyposecretion of Insulin = Excess Blood sugar (Hyperglycemia)
- Hypersecretion of Insulin = Decrease Blood sugar (Hypoglycemia)

↓ Glucagon

- Stimulates the breakdown of glycogen into glucose in the liver, thereby rising sugar level in the blood.

→ Insulin has an opposite action to that glucagon.

→ Disorder :-

(1) Diabetes Mellitus :- Caused due to deficiency in the secretion or action of Insulin.

- Hyperglycemia is seen.

⇒ Treatment :-

o Insulin injection.

o Also controlled by controlling diet, reducing the excess

- Insulin injection.
- Also controlled by controlling diet, reducing the excess weight, regular physical exercise & taking medicines.

(8) Gonads (Male and female).

Testes.

- Male sex hormone Testosterone
- Regulates spermatogenesis and secondary sexual characters at puberty.

Ovaries.

- Female sex hormone estrogen
- stimulates formation of ova and development of secondary sexual characters at puberty

(9) Pineal glands :- (smallest endocrine gland).

- small sized gland attached to the dorsal side of the brain.
- Hormone :- Melatonin.
 - controls the biological clock.
 - Regular activities such as sleeping & waking.