

Hello Everyone

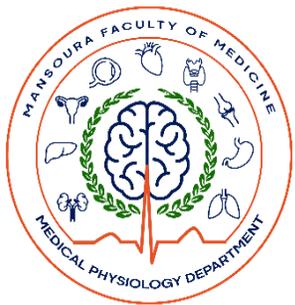
**Hope You Are Having A
Wonderful Physiological Day**
😊😊😊



A vibrant, stylized illustration of a study desk. On the left, a wooden desk holds a framed world map with green continents on a blue background. Below the map is a row of colorful books in yellow, orange, and green. In front of the desk sits a green cactus in a brown pot with three triangular cutouts. To the right of the desk is a small shelf with two books. In the bottom right corner, a green plant with large leaves sits in a blue and white polka-dot pot. The background is a light pink wall with decorative stars and a string of colorful pennants in the top right. The floor is a grid of orange and yellow tiles.

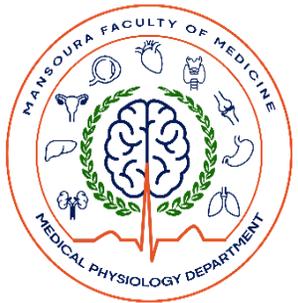
ARE YOU
READY ?

LET'S GET STARTED!



Hypothalamus & Posterior Pituitary

Sem 4



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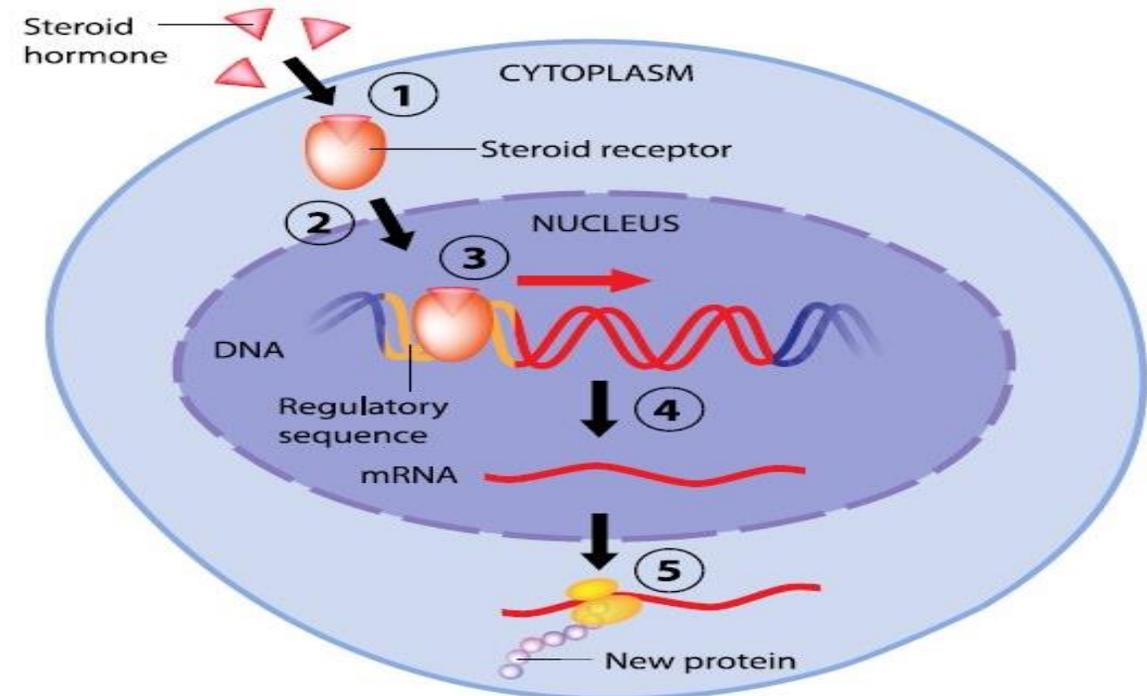
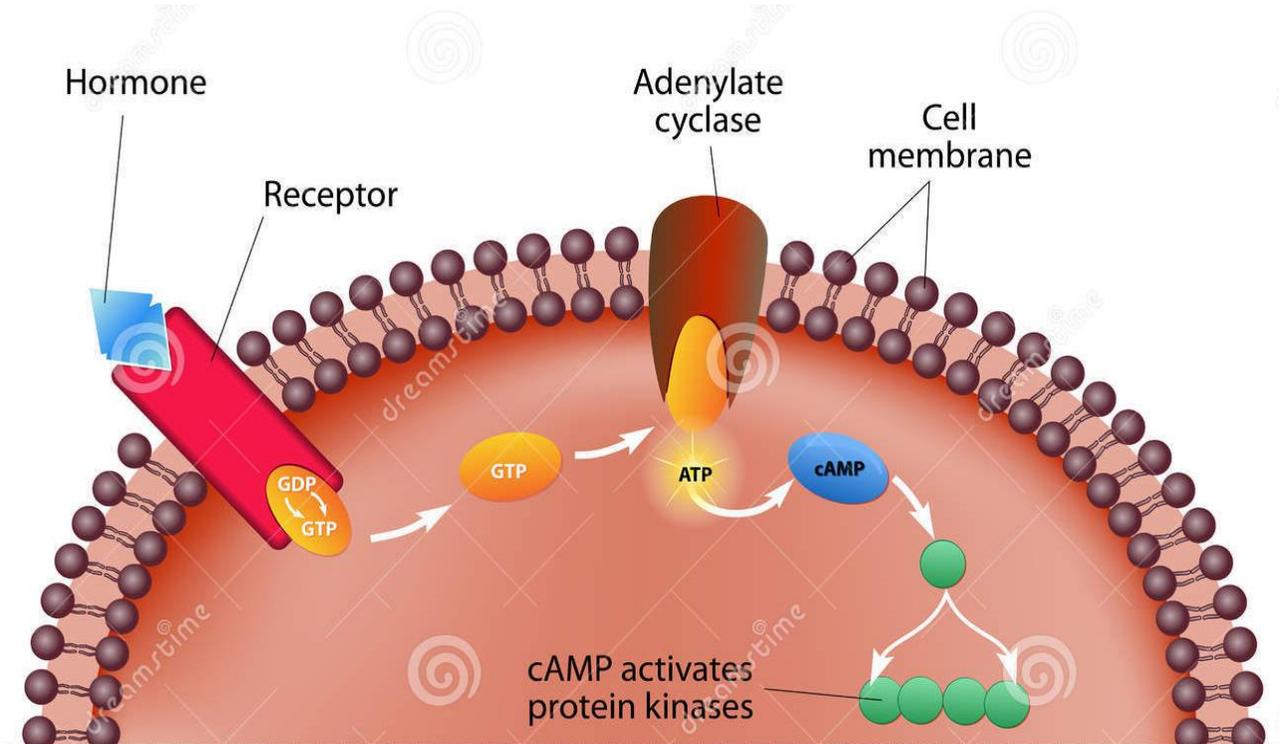
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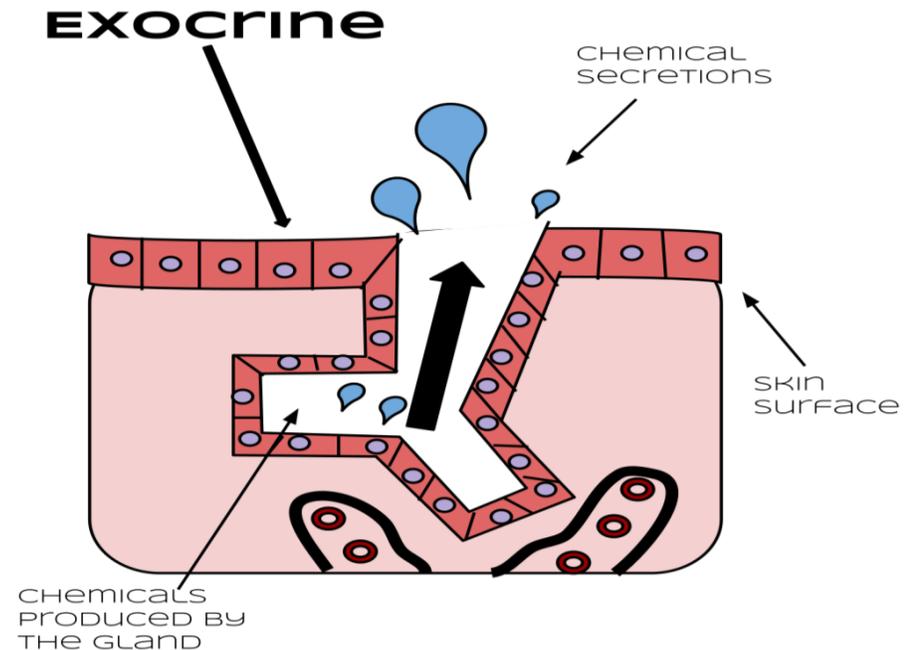
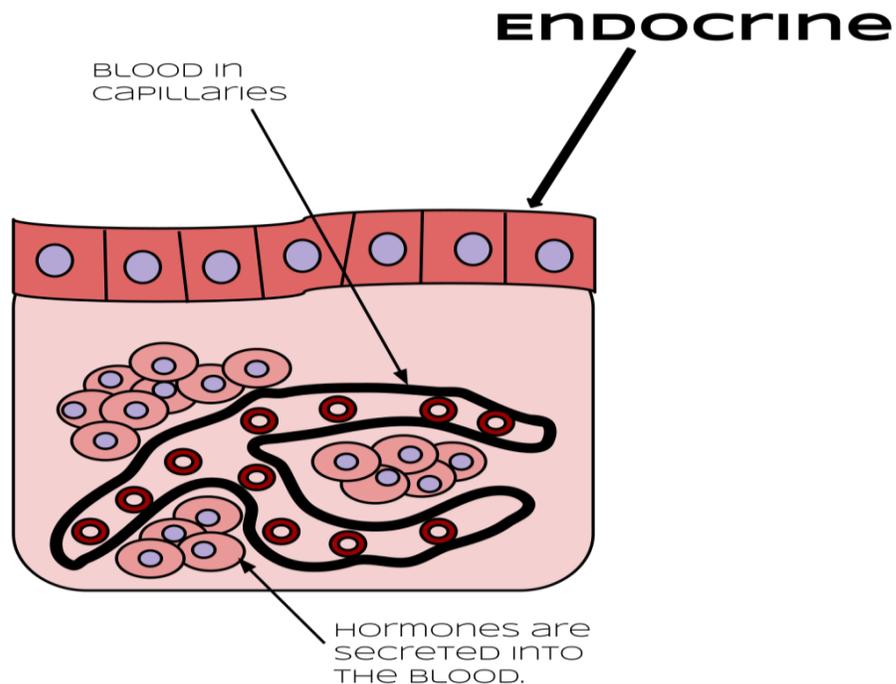
Hormones

- They are the **secretory product of endocrine glands**.
- **Secreted in a catalytic amount (very small amounts)** into blood stream to **reach specific target cells (which have a specific hormone receptors)**, where they produce **physiologic, morphologic and biochemical changes**.

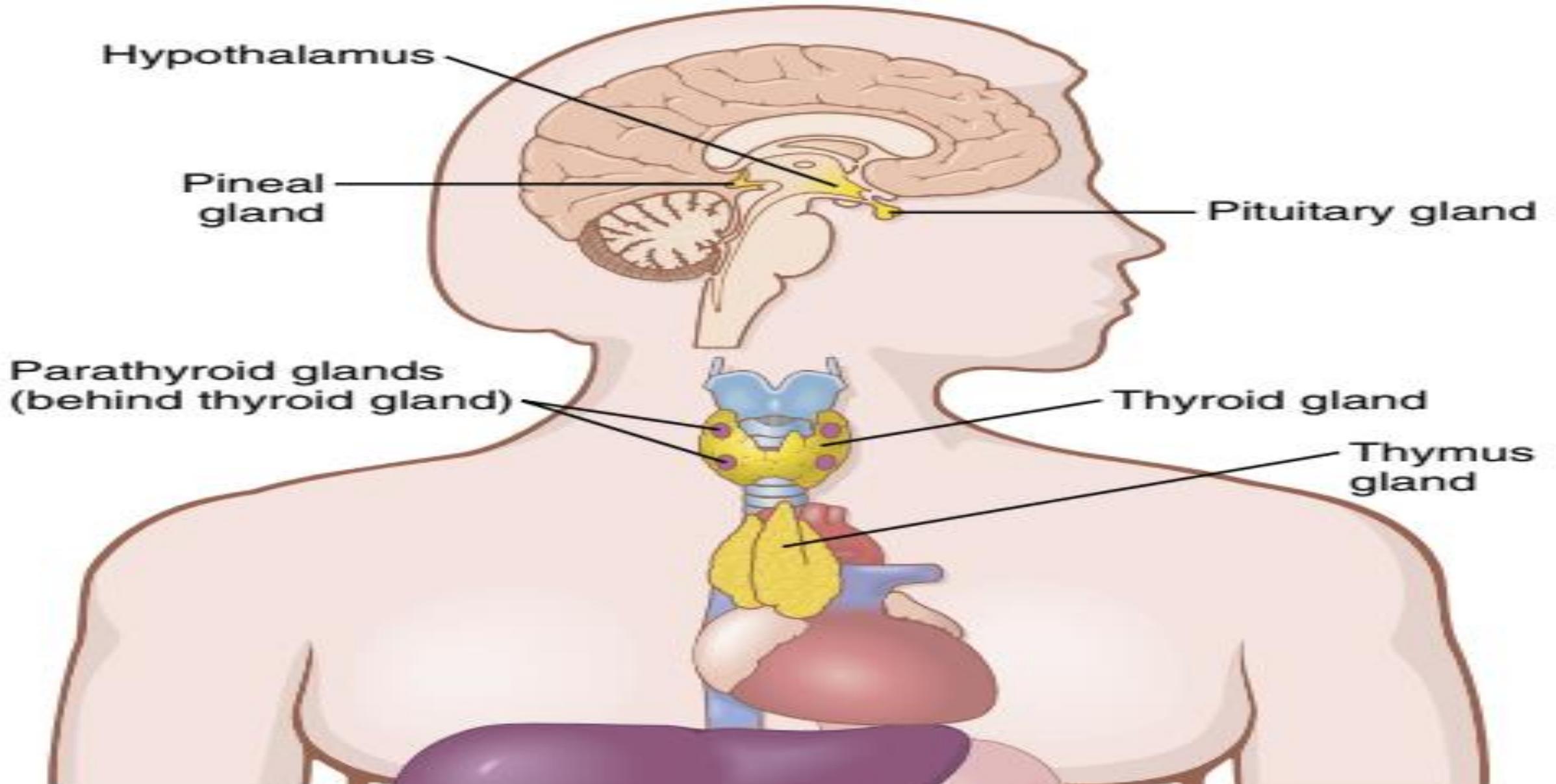


Endocrine glands

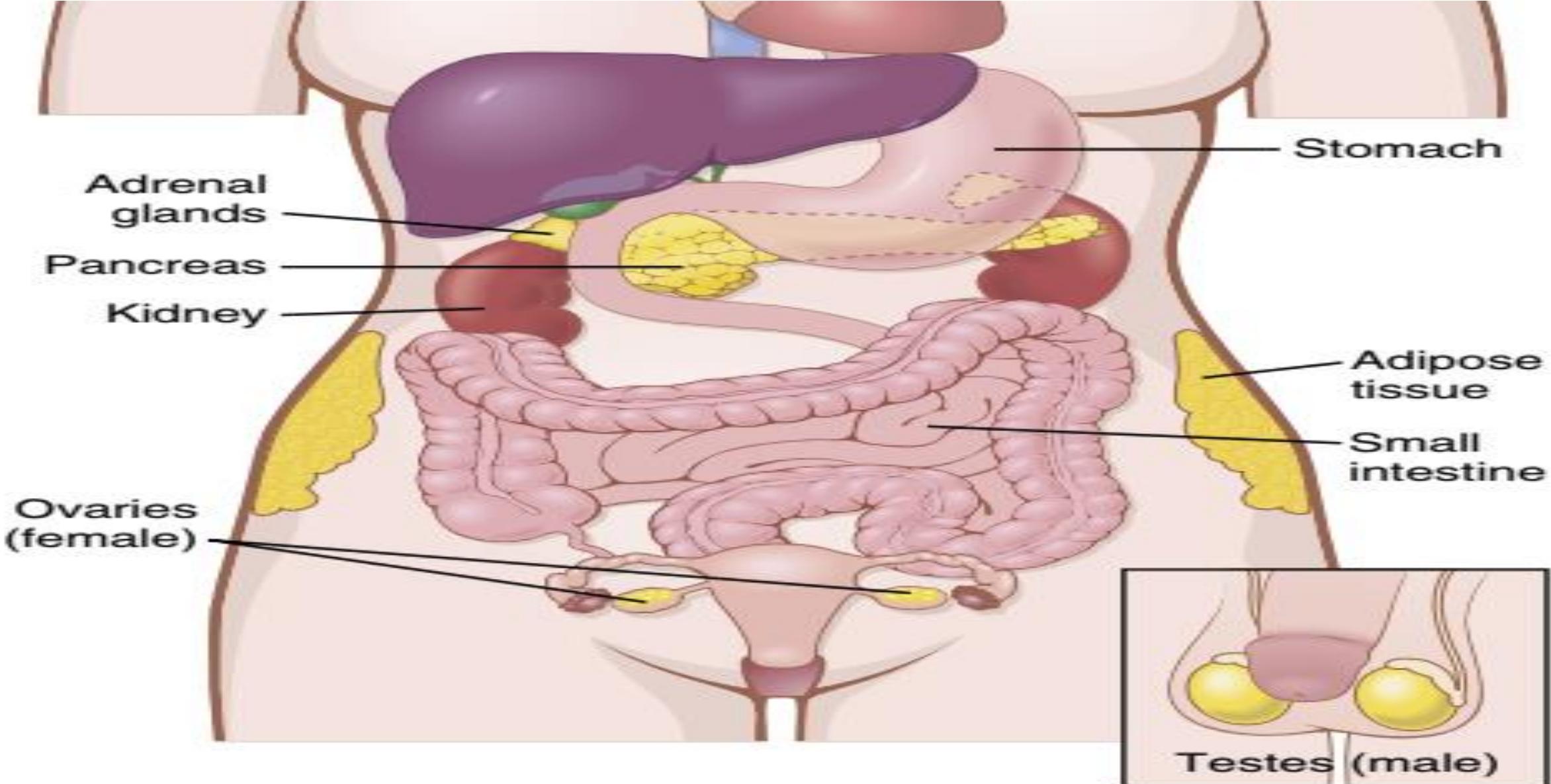
- The **endocrine glands** are group of cells that **secrete** certain chemicals called **hormones**.
- They are **also called ductless glands** because they **release** their hormones **directly in the circulating blood**.



Endocrine glands



Endocrine glands



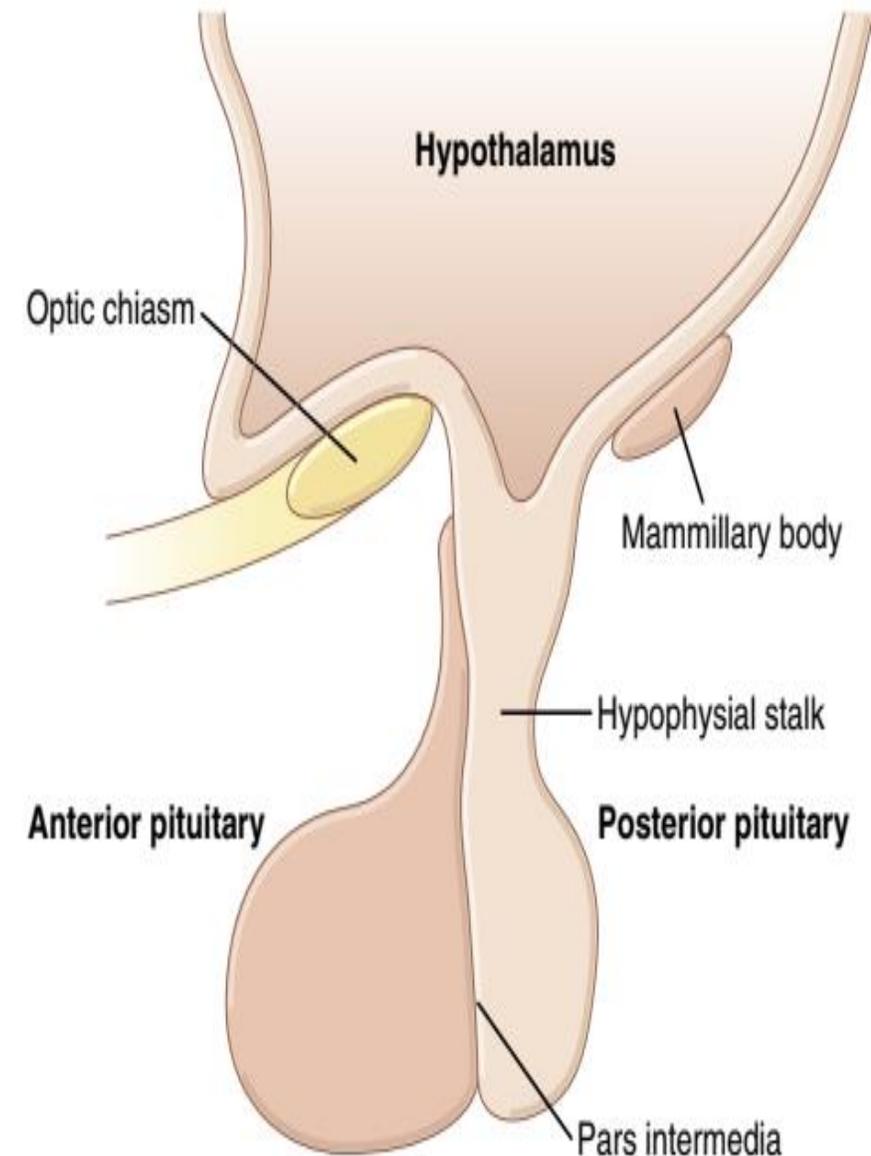
Hypothalamus

Has 2 endocrinal functions:

a) Controls the secretion of the anterior pituitary gland, by:

- I. Releasing and release inhibiting hormones for: growth hormone, prolactin and melanocyte stimulating hormone.
- II. Releasing hormones for: thyrotropin, corticotropin and gonadotropin.

b) Synthesis & Releases the posterior pituitary hormones: antidiuretic hormone and oxytocin.



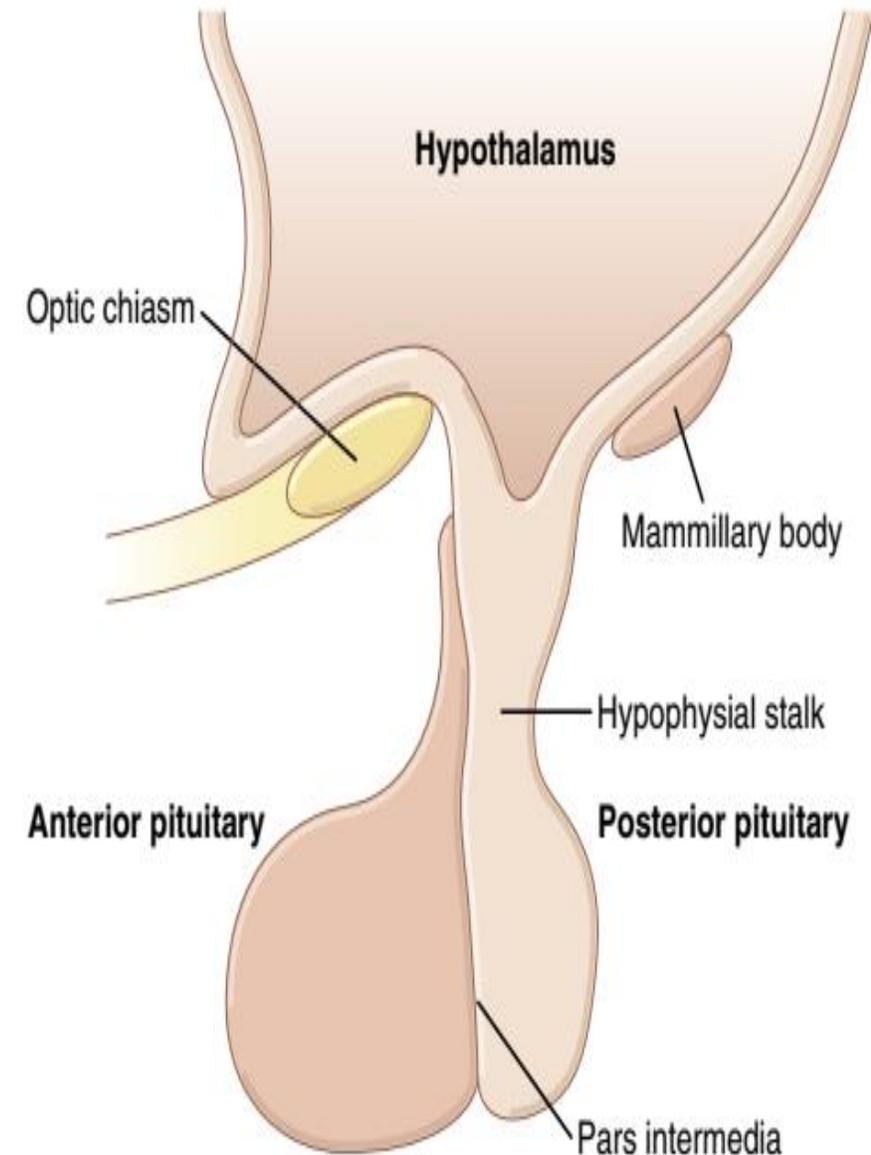
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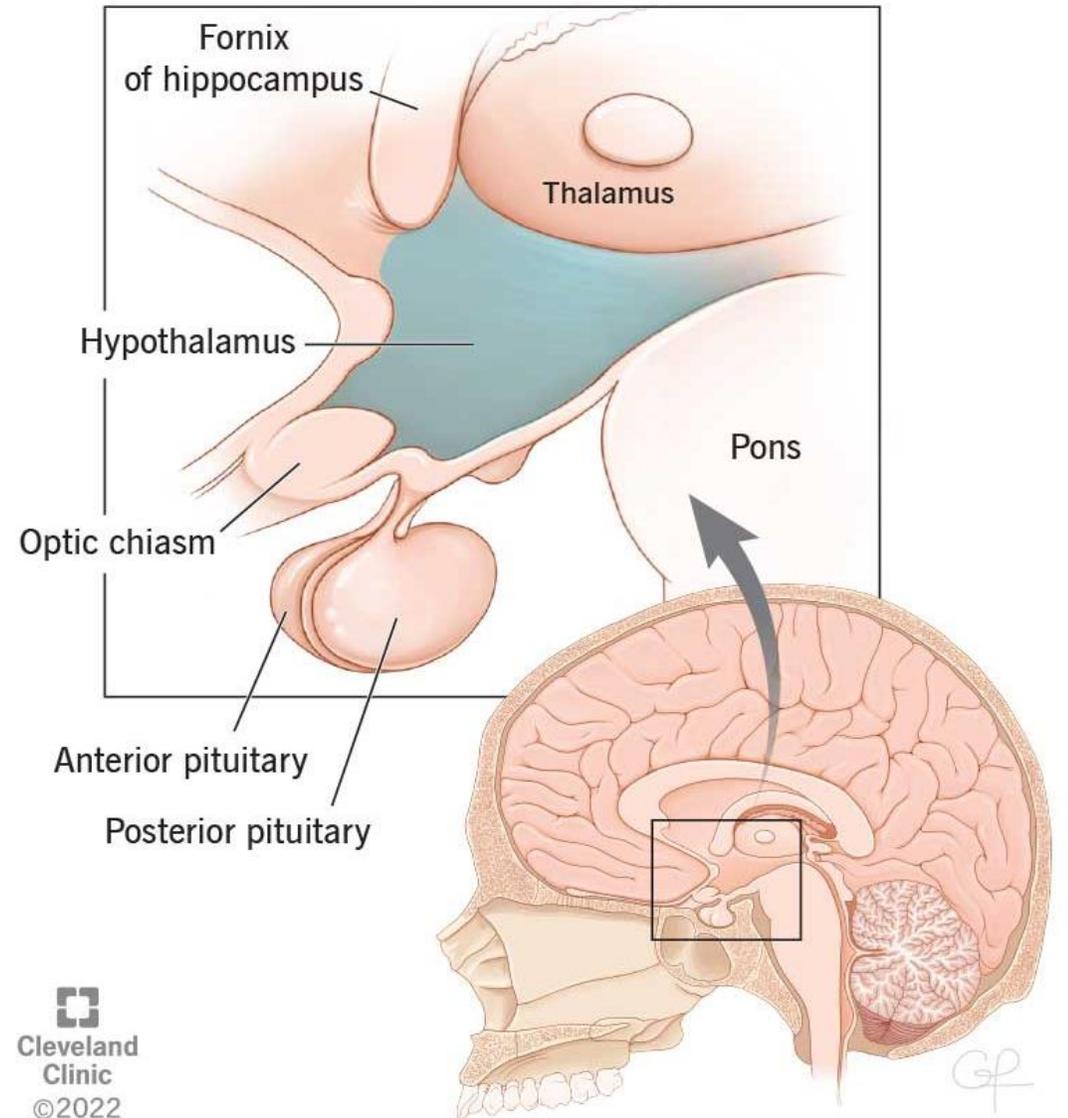
Pituitary Gland

Shape: ovoid.

Weight: 500 – 600mg.

Site: At the base of brain in a small cavity called **sella tursica** (pituitary fossa).

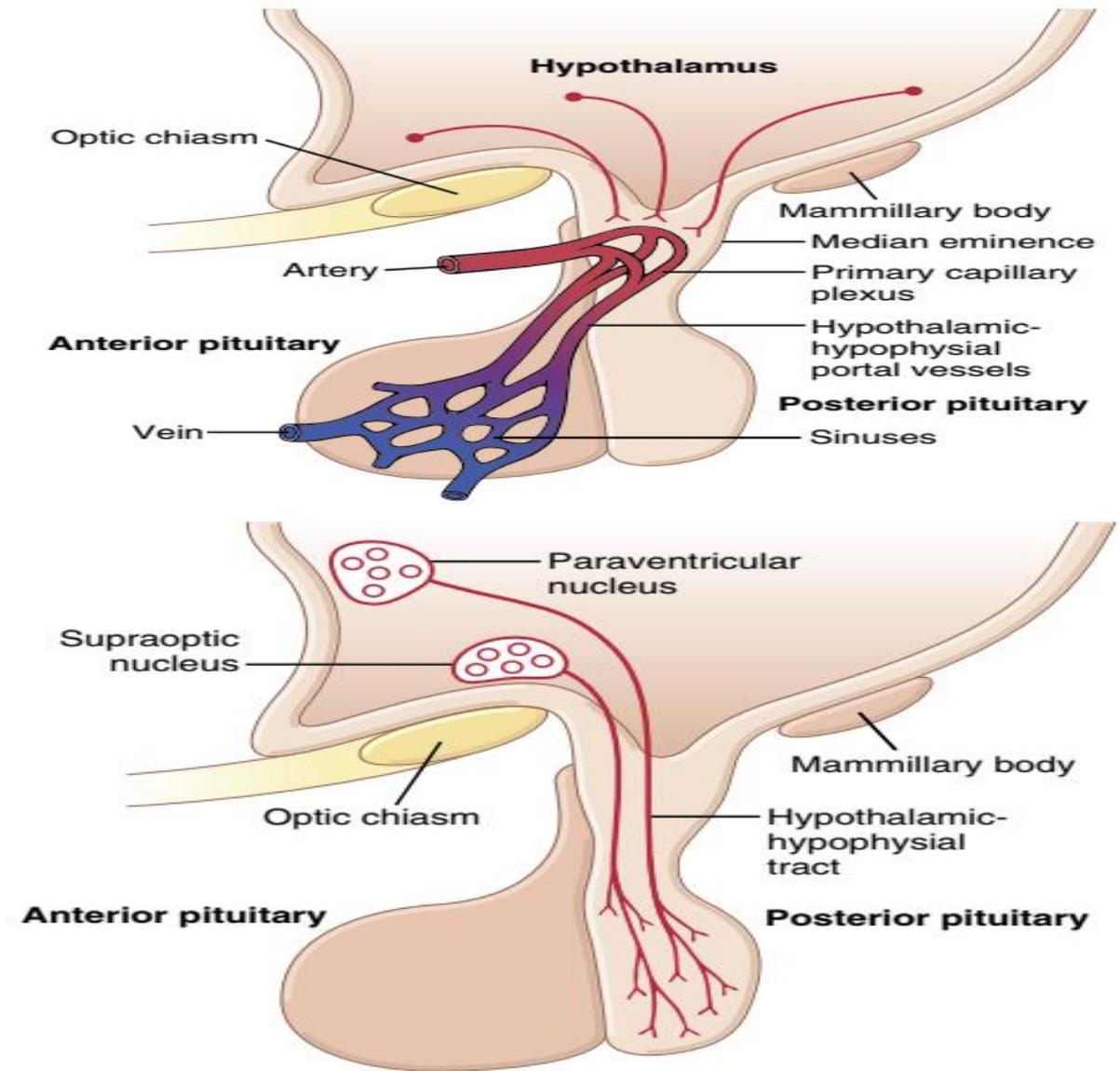
The pituitary stalk connects the gland to hypothalamus



Hypothalamic connections to pituitary gland

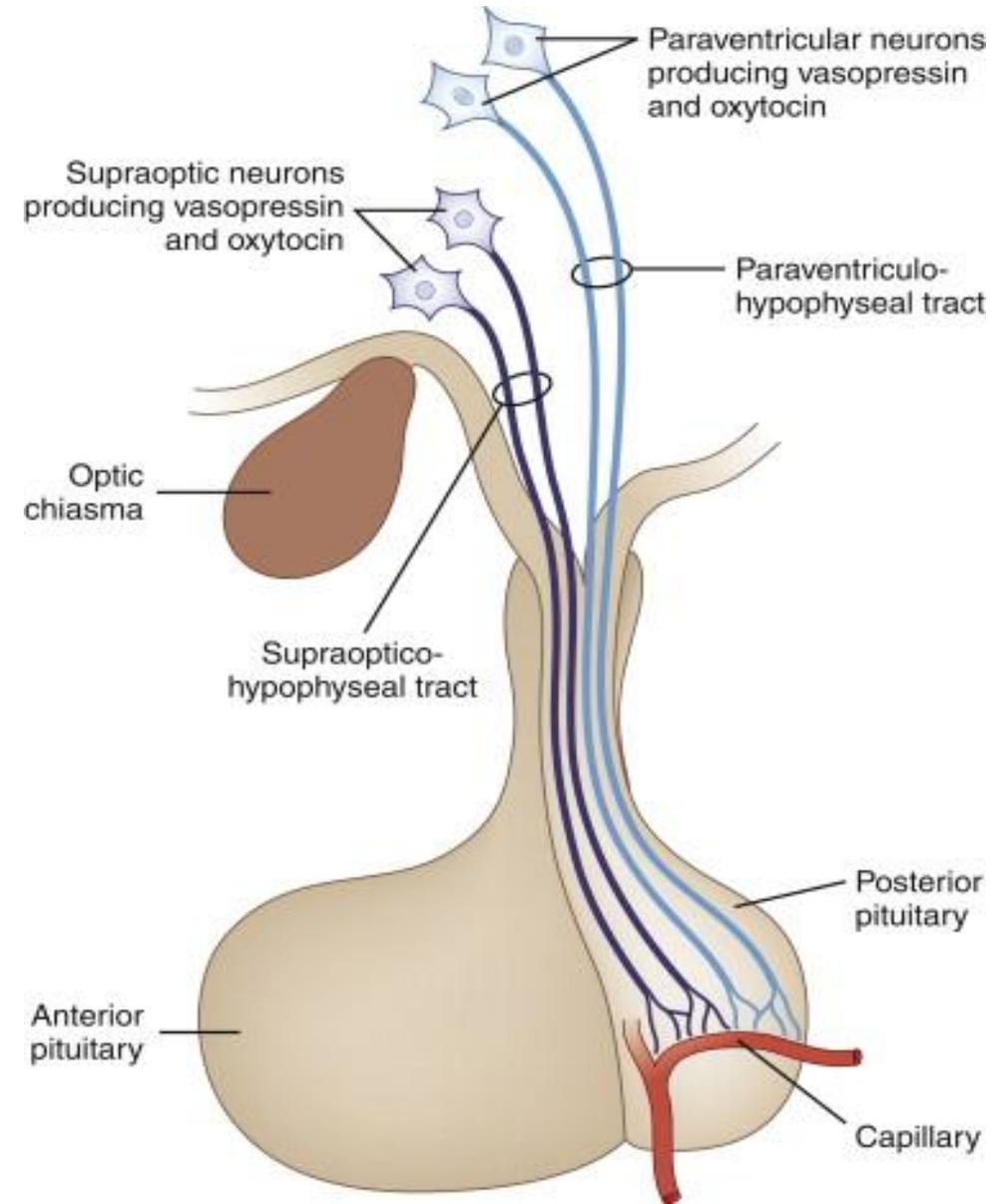
1- **Vascular connection:**
hypothalamo-hypophyseal portal circulation between hypothalamus & anterior pituitary.

2- **Neural connection:**
hypothalamo-hypophyseal tract between hypothalamus & posterior pituitary



Posterior Pituitary (Neurohypophysis)

- **Posterior Pituitary** is **composed** mainly of **glial-like cells** which **do not secrete hormones** but **support terminal nerve endings** from the **hypothalamus**,
 - **ADH** is formed in **supra optic nucleus**
 - **Oxytocin** is formed in **paraventricular nucleus**.
- **The descending axons** constitute the **hypothalamo-hypophyseal tract**.



Mechanism of secretion of ADH & Oxytocin

- **ADH and oxytocin** are synthesized in cell bodies of these neurosecretory neurons and incorporated into granules with a binding protein (neurophysin) [neurophysin 1 for oxytocin & neurophysin 2 for ADH].
- The granules pass down the axons of hypothalamo-hypophyseal tract to dilated nerve endings (Hering bodies) in Posterior Pituitary, from which the hormones enter the blood.
- **Release of hormone:** Depolarization of supraoptic and paraventricular nuclei → generation of nerve impulse which reach the nerve terminal → Ca^{2+} influx → fusion of secretory granules with knob membrane → exocytosis of ADH and oxytocin to the adjacent capillaries.

Function of Antidiuretic hormone (ADH)

- **Renal effects:** Reabsorption of free water from glomerular filtrate in DCT and CDs :
ADH binds to a specific plasma membrane receptor → **++ adenylyl cyclase** → **↑ intra cellular cAMP** → **++ protein kinase** → **phosphorylation of membrane protein** → **↑ membrane permeability to water** → **back diffusion of water from hypotonic tubular urine to hypertonic interstitial fluid of renal medulla.**
- **Extra renal effects:** Systemic administration of large doses → contraction of smooth muscles particularly in the blood vessels leading to
 - Increase ABP.
 - Coronary VC.
 - Splanchnic VC (so, used in controlling GIT bleeding).
- **On the anterior pituitary:** ↑ secretion of ACTH as it may function as CRH.

Control of ADH secretion

(1) Osmotic regulation: \uparrow plasma osmolarity (1-2%) (\uparrow H₂O loss, \downarrow water intake, administration of solutes as Na⁺) \rightarrow loss of intracellular water from osmoreceptor neurons \rightarrow their stimulation \rightarrow \uparrow ADH release \rightarrow \uparrow water reabsorption from tubular fluid in kidney \rightarrow dilution of ECF \rightarrow return to normal osmotic composition.

(2) Blood volume:

- Arterial baroreceptors (carotid and aortic) and Stretch receptors in walls of left atrium \rightarrow tonic inhibition of ADH release.
- Hypovolemia \rightarrow \downarrow inhibitory impulses from these pressure receptors \rightarrow \uparrow ADH release.
- Renin release from juxta glomerular apparatus (JGA) \rightarrow \uparrow AII \rightarrow Stimulate thirst & \uparrow ADH release.

Control of ADH secretion

(3) Other Factors:

Inhibitors of ADH release	Stimulators of ADH release
<ul style="list-style-type: none">• Diuretics.• Chronic water loading.• PGE.• Cortisol.• \downarrow K^+ and \uparrow Ca^{2+}.• Cold weather.• Ethanol.	<ul style="list-style-type: none">• Sulfonyl ureas.• Nicotine.• Barbiturates.• Opiates.• Estrogen.• Progesterone.• Increase temperature

Diabetes Insipidus

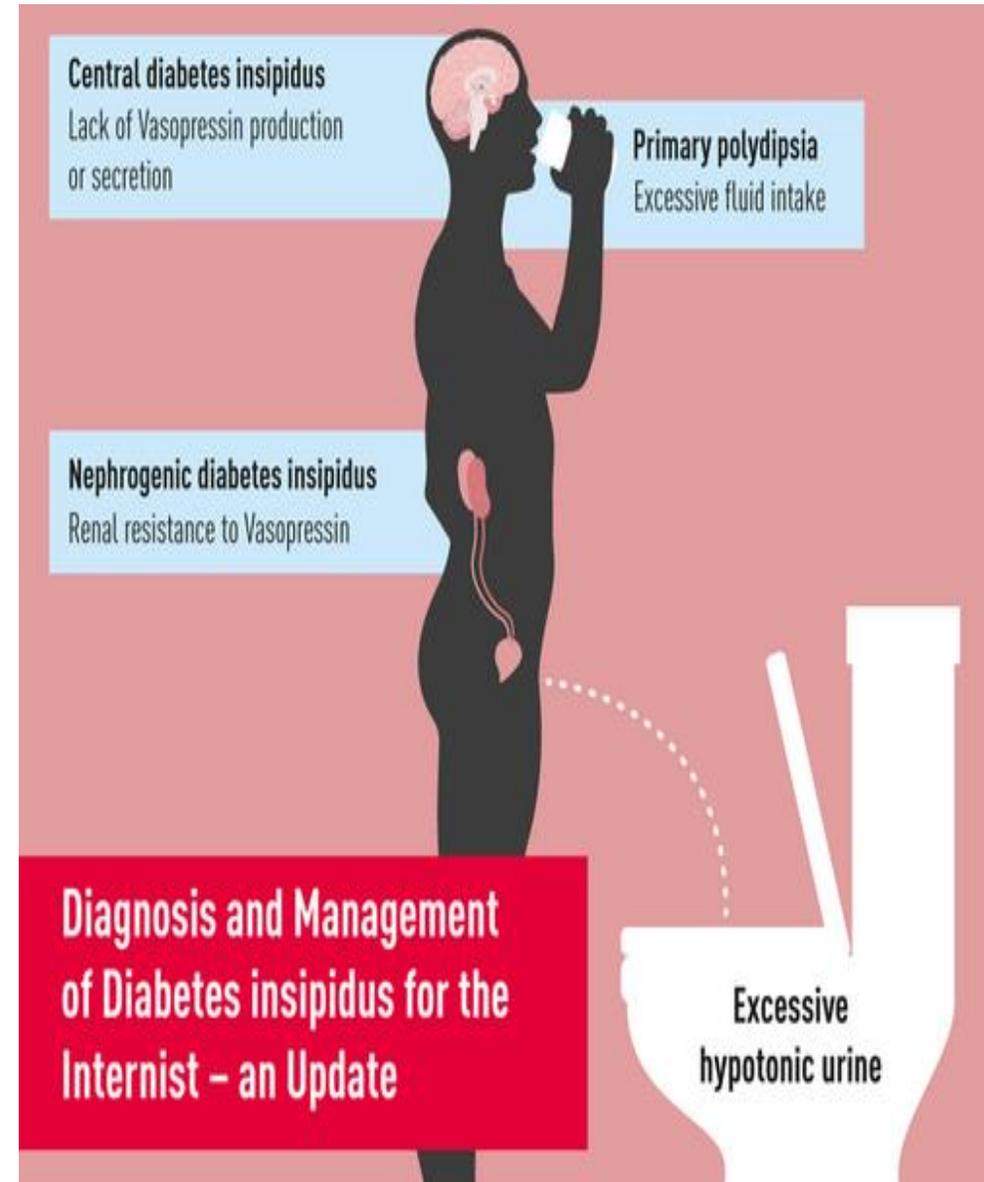
Causes:

- **↓ ADH release (central type)**
- **Inability of kidney to respond to ADH (nephrogenic type).**

Characters:

- **Polyurea (25L/day), Diluted (SG: 1001-1003) Why ???**
- **Polydipsia** as polyuria produces intense thirst
- **Anorexia and general weakness** due to loss of vitamins.

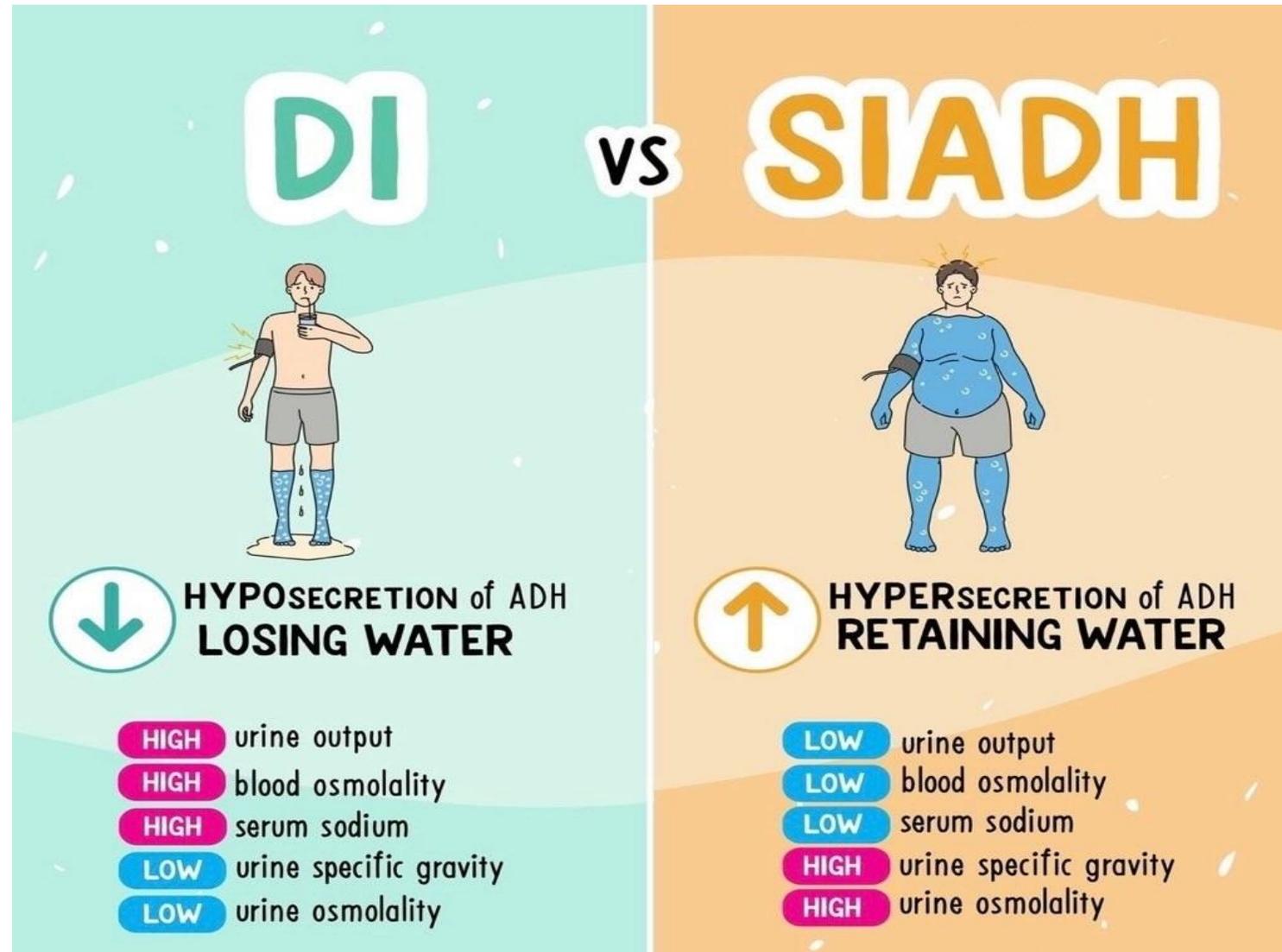
Treatment: ADH administration.



Syndrome of Inappropriate ADH hypersecretion (SIADH)

Manifestations:

1. **↑ ECF** volume.
2. **↑ plasma volume** →
↑ ANP → ↑ Na⁺ excretion.
3. **Hyponatremia** →
headache, drowsiness, nausea, and coma.
4. **↑ urine** osmolarity.



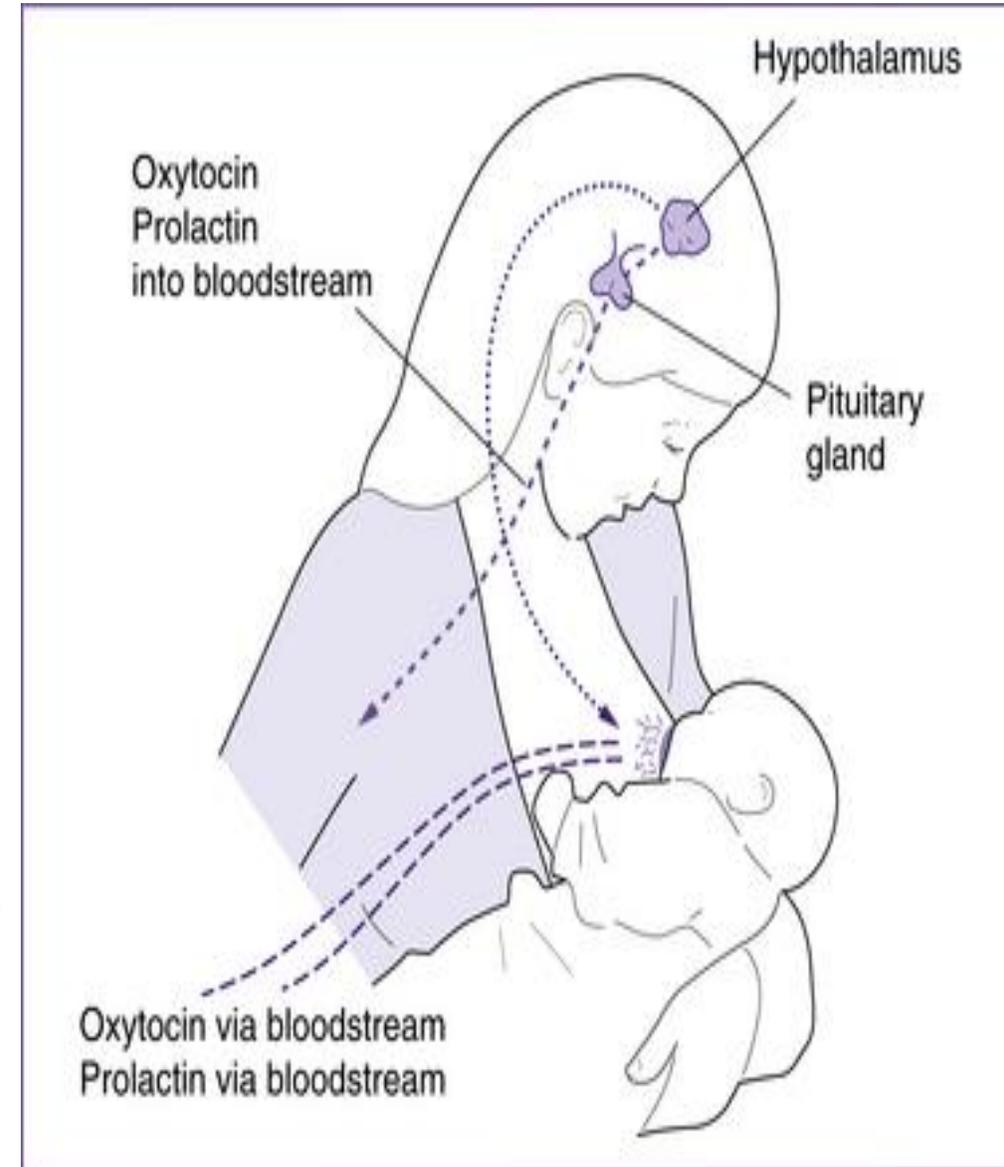
Oxytocin Hormone

Mech. of action: ↑ intracellular Ca^{2+} .

Functions:

1. Milk-letting effect:

- By stimulation of myoepithelial cells of alveoli of mammary glands → force milk into ducts.
- This action is potentiated by estrogen & inhibited by catecholamines.
- **Suckling reflex: suckling of breast** by infant → stimulate touch receptors at nipple and areola → send afferent impulses to hypothalamus → release of oxytocin and prolactin.



Oxytocin Hormone

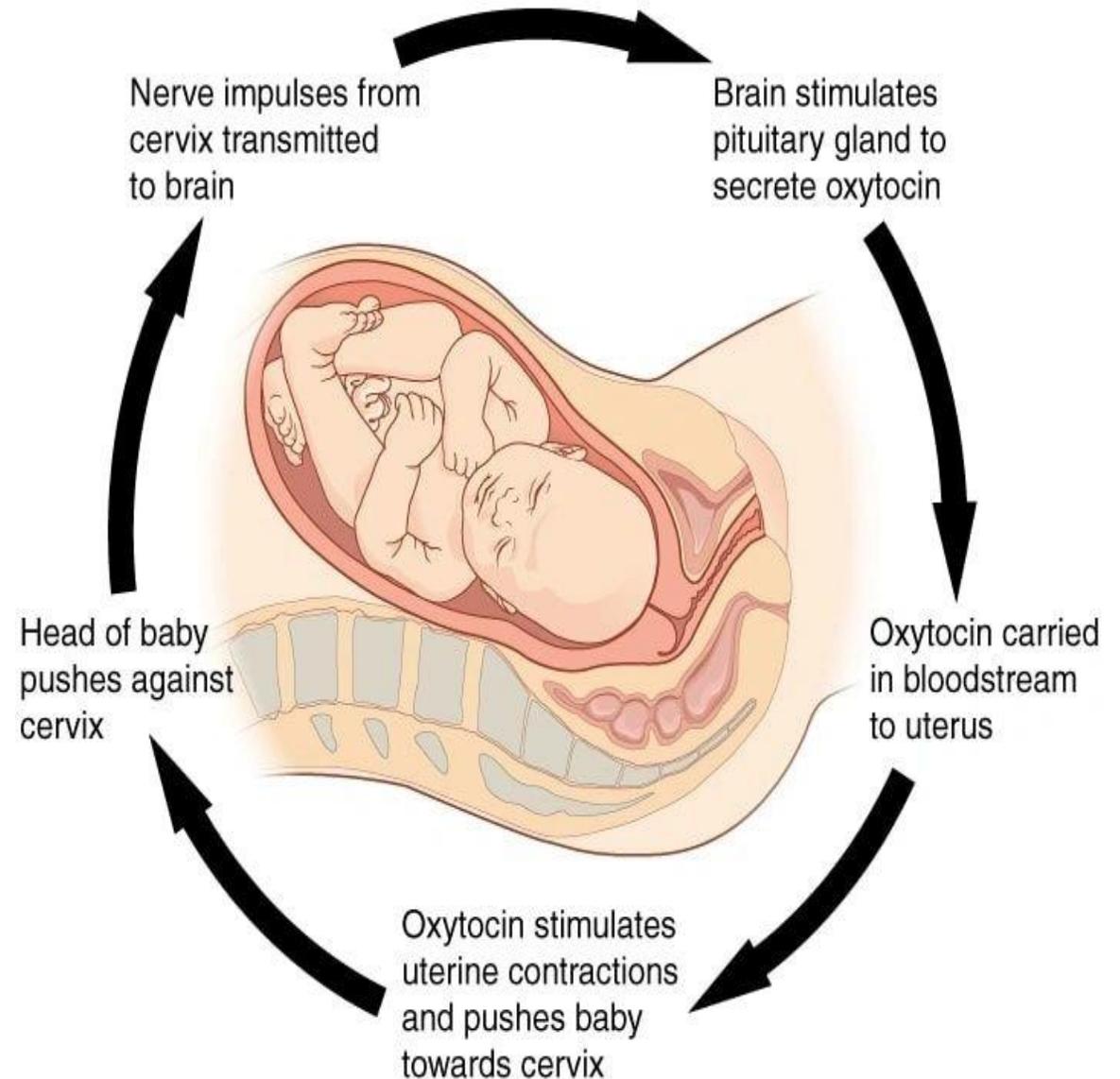
Functions:

2. Contraction of uterus:

➤ By **lowering threshold** for depolarization of **myometrial muscles**. This action is **potentiated by estrogens & inhibited by progesterone**.

➤ Importance:

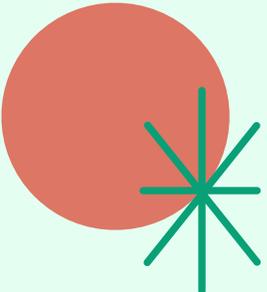
- **Initiate labor.**
- **Post partum contractions → hemostasis** after evacuation of the placenta.
- **Involution of uterus after delivery.**



Oxytocin Hormone

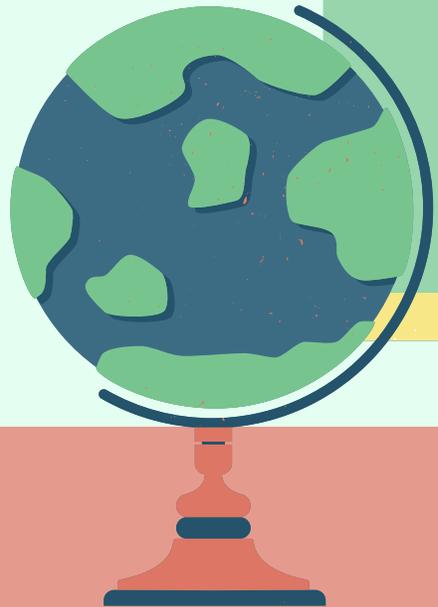
Functions:

- 3. Transport of sperms in uterus during intercourse:** by the end of intercourse → oxytocin release → uterine contractions → Orgasm sensation & Suck of sperms into uterus.
- 4. In males:** discharge of sperms from seminiferous tubules and epididymis to vas deferens.
- 5. Sweat secretion:** from sweat glands at axilla, nipples, groin and perineum → sex attraction in animals.



Any Questions

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Thank

You