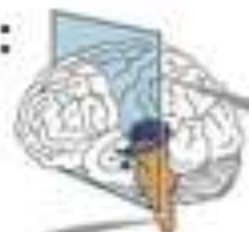


# ENDOCRINE SYSTEM-PART 2

## HYPOTHALAMUS AND PITUITARY GLAND

Dr. SHEETAL JAIN

Learn the 3 endocrine organs on this slide:  
Hypothalamus  
Pituitary (hypophysis)  
Pineal



Hypothalamus  
Anterior pituitary (adenohypophysis)  
Posterior pituitary (neurohypophysis)

This diagram shows a detailed view of the pituitary gland. The hypothalamus is shown as a blue, pea-sized structure. The anterior pituitary (adenohypophysis) is a larger, pinkish structure. The posterior pituitary (neurohypophysis) is a smaller, yellowish structure. The pituitary gland is connected to the hypothalamus by a stalk.

Hypothalamus  
Pituitary (hypophysis)

This large anatomical diagram shows a sagittal view of the brain. The hypothalamus is a small, pea-sized structure located below the thalamus. The pituitary gland (hypophysis) is a small, pea-sized structure hanging from the base of the brain. The brain stem is the part of the brain that connects the cerebrum with the spinal cord.

# Hypothalamus controls anterior pituitary hormone release

- **Releasing hormones (releasing factors)**

Secreted like neurotransmitters from neuronal axons into capillaries and veins to anterior pituitary (adenohypophysis)

**TRH**----turns on TSH

**CRH**----turns on ACTH

**GnRH (=LHRH)**---turns on FSH and LH

**PRF**----turns on PRL

**GHRH**----turns on GH

- **Inhibiting hormones**

**PIF**----turns off PRL

**GH inhibiting hormone** ---turns off GH

# What the letters mean...

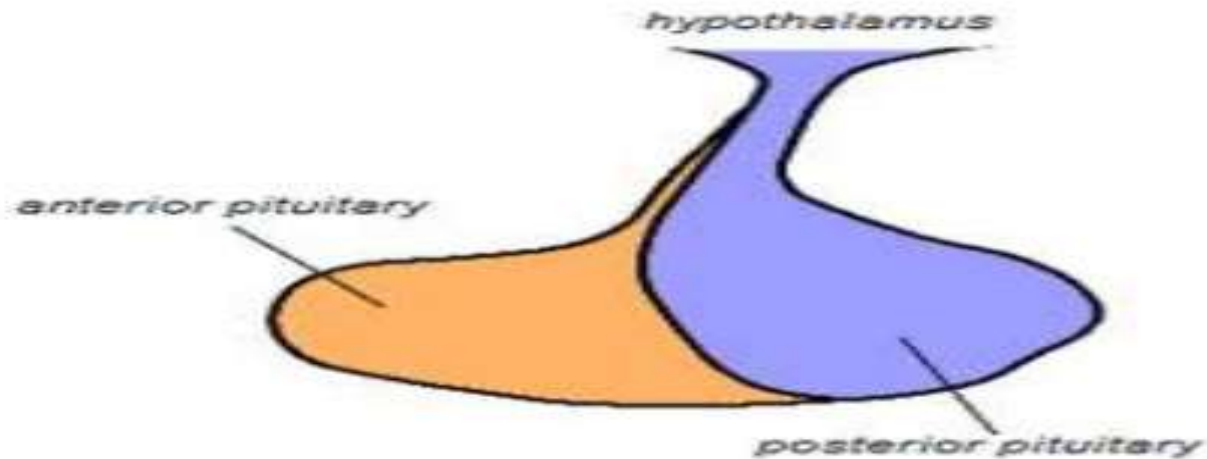
- Releasing hormones (releasing factors) of **hypothalamus**
  - Secreted like neurotransmitters from neuronal axons into capillaries and veins to anterior pituitary (adenohypophysis)
  - TRH (thyroid releasing hormone) ----turns on\* TSH
  - CRH (corticotropin releasing hormone) ----turns on ACTH
  - GnRH (gonadotropin releasing hormone) --turns on FSH and LH
  - PRF (prolactin releasing hormone) ----turns on PRL
  - GHRH (growth hormone releasing hormone) ---turns on GH
- Inhibiting hormones of **hypothalamus**
  - PIF (prolactin inhibiting factor) ----turns off PRL
  - GH (growth hormone) inhibiting hormone ---turns off GH

*The hypothalamus controls secretion of hormones which in their turn control the secretion of hormones by the thyroid gland, the adrenal cortex and gonads: in this way the brain controls these endocrine glands*

\*Note: "turns on" means causes to be released

# PITUITARY GLAND

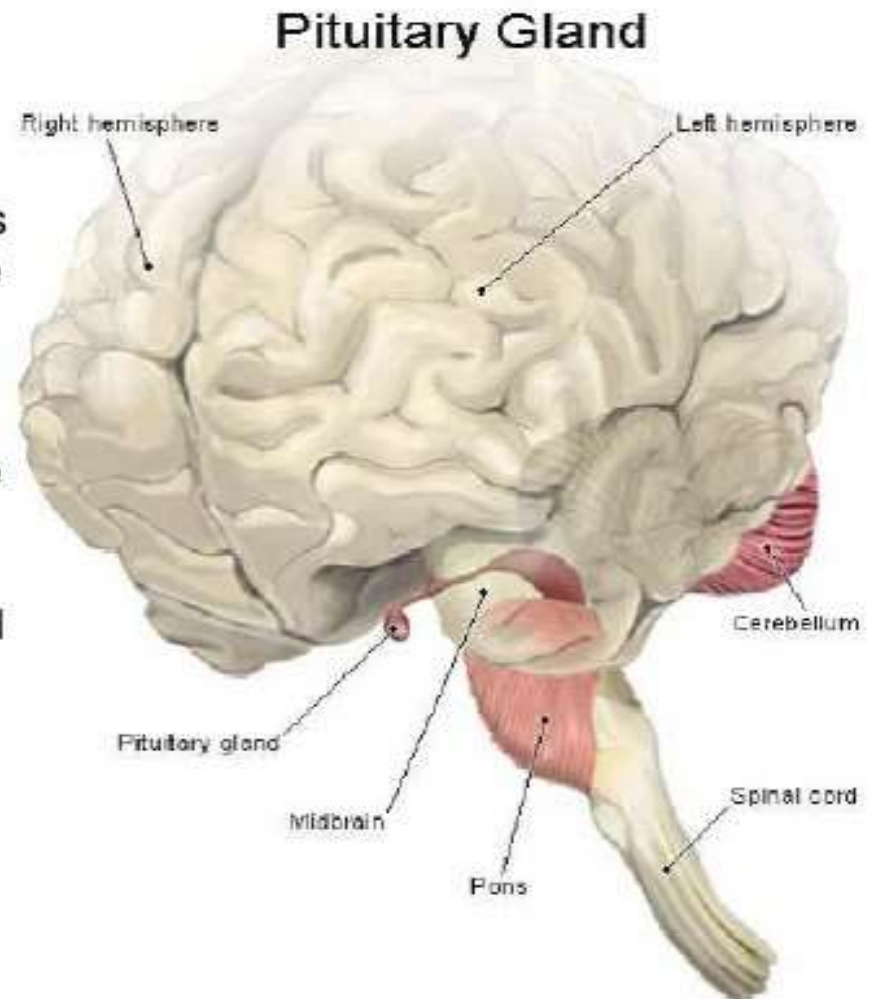
## PITUITARY GLAND



Has two parts :  
a) anterior lobe  
b) posterior lobe

## Origin and location of Pituitary Gland:

- The pituitary gland is also called The Hypophysis, is the smallest endocrine gland.
- Hypophysis (meaning undergrowth) is named because of its location below the brain as undergrowth.
- This is an unpaired small ovoid gland and is no longer than the end of the little finger.
- It is located at the base of the brain and lies below the diencephalon in a depression of basis phenoid boneof the skull called Sella Turcica.
- It is a complex structure formed of ectodermic growth of the mouth cavity and down growth of the infandibulum.





## Structure of Pituitary Gland:

- Structurally, the pituitary gland is divided into a larger frontal region (adenohypophysis) and a smaller posterior region (neurohypophysis).
- The gland is connected to a region of the brain called the hypothalamus by the pituitary stalk. Directly above the pituitary gland and in front of the pituitary stalk are the crossing fibers of the optic nerves, called the optic chiasm.
- On each side of the pituitary gland is the cavernous sinus. Through each cavernous sinus runs a carotid artery that carries blood to the brain, and important nerves that control eye movements.
- Because of the close proximity of the pituitary gland to major intracranial nerves and blood vessels, as well as the vital hormonal control the pituitary gland provides, disorders of the pituitary can cause a wide spectrum of symptoms, both hormonal and neurological.

## **Anterior pituitary (Adenohypophysis):**

- A major organ of the endocrine system, the **anterior pituitary**, also called the **adenohypophysis**, is the glandular, anterior lobe of the pituitary gland.
- The anterior pituitary regulates several physiological processes including stress, growth, and reproduction.
- Its regulatory functions are achieved through the secretion of various peptide hormones that act on target organs including the adrenal gland, liver, bone, thyroid gland, and gonads.
- The anterior pituitary itself is regulated by the hypothalamus and by negative feedback from these target organs.
- Disorders of the anterior pituitary are generally classified by the presence of over- or underproduction of pituitary hormones.
- For example, a prolactinoma is a pituitary adenoma that overproduces prolactin. In Sheehan's syndrome of postpartum hypopituitarism, the anterior pituitary uniformly malfunctions and underproduces all hormones.
- Proper function of the anterior pituitary and of the organs it regulates can often be ascertained via blood tests that measure hormone levels.



## Anatomy

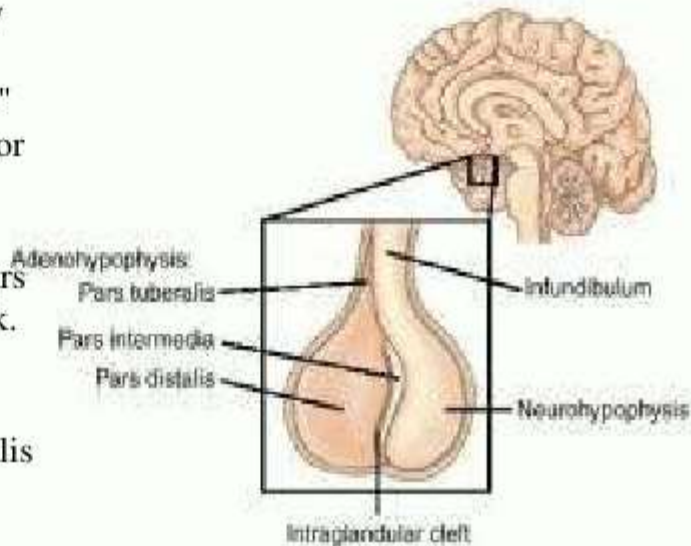
The pituitary gland is a pea-sized gland that sits in a protective bony enclosure called the sella turcica. It is composed of three lobes: anterior, intermediate, and posterior. In many animals, these three lobes are distinct. However, in humans, the intermediate lobe is but a few cell layers thick and indistinct; as a result, it is often considered part of the anterior pituitary. In all animals, the fleshy, glandular anterior pituitary is distinct from the neural composition of the posterior pituitary.

The anterior pituitary is composed of multiple parts:

- **Pars distalis** The pars distalis, or "distal part", comprises the majority of the anterior pituitary and is where the bulk of pituitary hormone production occurs. Occasionally, "pars distalis" is incorrectly used as a synonym for the anterior pituitary. [citation needed]

- **Pars tuberalis** The pars tuberalis, or "tubular part", forms a sheath extending up from the pars distalis and wrapping around the pituitary stalk. Its function is poorly understood.

- **Pars intermedia** The pars intermedia, or "intermediate part", sits between the pars distalis and the posterior pituitary and is often very small in humans.



## Posterior pituitary(Neurohypophysis):

The **posterior pituitary** (or **neurohypophysis**) comprises the posterior lobe of the pituitary gland and is part of the endocrine system. Despite its name, the posterior pituitary gland is not a gland, *per se*; rather, it is largely a collection of axonal projections from the hypothalamus that terminate behind the anterior pituitary gland.

### Anatomy:

The posterior pituitary consists mainly of neuronal projections (axons) extending from the supraoptic and paraventricular nuclei of the hypothalamus. These axons release peptide hormones into the capillaries of the hypophyseal circulation. In addition to axons, the posterior pituitary also contains pituicytes, specialized glial cells resembling astrocytes. Classification of the posterior pituitary varies, but most sources include the three regions below:

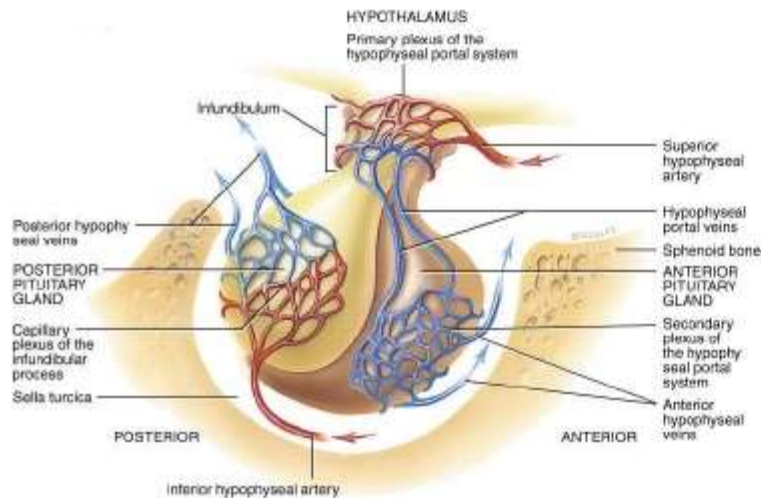
- Pars nervosa Also called the neural lobe or posterior lobe, this region constitutes the majority of the posterior pituitary, and is sometimes (incorrectly) considered synonymous with it. Notable features include Herring bodies and pituicytes.
- Infundibular stalk Also known as the infundibulum or pituitary stalk, the infundibular stalk bridges the hypothalamic and hypophyseal systems.

# Anterior Pituitary Gland

## Hormones:

human growth hormone- hGH  
thyroid stimulating - TSH  
follicle stimulating- FSH  
leutinizing hormone - LH  
prolactin  
adrenocorticotropin - ACTH  
melanocyte stimulating - MSH

- 5 types of cells:
  - **somatotrophs:** secrete hGH/somatotropin
  - **thyrotrophs:** secrete TSH/thyrotropin
  - **gonadotrophs:** secrete FSH, LH
  - **lactotrophs:** secrete prolactin
  - **corticotrophs:** secrete ACTH/corticotropin & MSH



THANKS