University of Mosul
Lecture No.: 3
College of Veterinary Medicine
Date:
Unit of Scientific Affairs
Website:

Lecture title: **The Endocrine System (Mechanisms of action\introduction to the pituitary gland)**

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Summary: **The 3rd lecture is a review of the hormone's action. Hormones exert their effects by binding to specific receptors either on the cell surface or within target cells, triggering signal transduction pathways that alter cellular activity. Peptide hormones typically act through membrane-bound receptors and second messengers, while steroid hormones cross the cell membrane and influence gene expression directly. The pituitary gland, often called the "master gland," plays a central role by secreting hormones that regulate other endocrine glands and various physiological functions.**

One of the important characteristics of the endocrine system is the **amplification of the signal.**

Amplification is the basis for the sensitivity of the endocrine system, and the actions of hormones are greatly amplified at the target cells.

Interaction of one hormonal molecule with its receptor can result in the formation of many active protein products that ultimately carry out the physiological effect.

Regulation of Hormonal Secretion:

The primary function of hormones is the regulation of various homeostatic activities. Hormonal concentration must be subject to **control according to the homeostatic need.**

Endocrine glands **do not** secrete their hormones at a constant rate, but **secretion rates of all hormones vary subject to control**.

Negative Feedback Control:

Negative feedback maintains the plasma concentration of a hormone at a given level. When the plasma concentration of free circulating thyroid hormone falls below a given set point.

The anterior pituitary secretes thyroid stimulating hormone (TSH) hormone.

Thyroid hormone in turn inhibits further secretion of TSH by the anterior pituitary.

Thus, the effect of particular hormone actions can bring about inhibition of its own secretion.

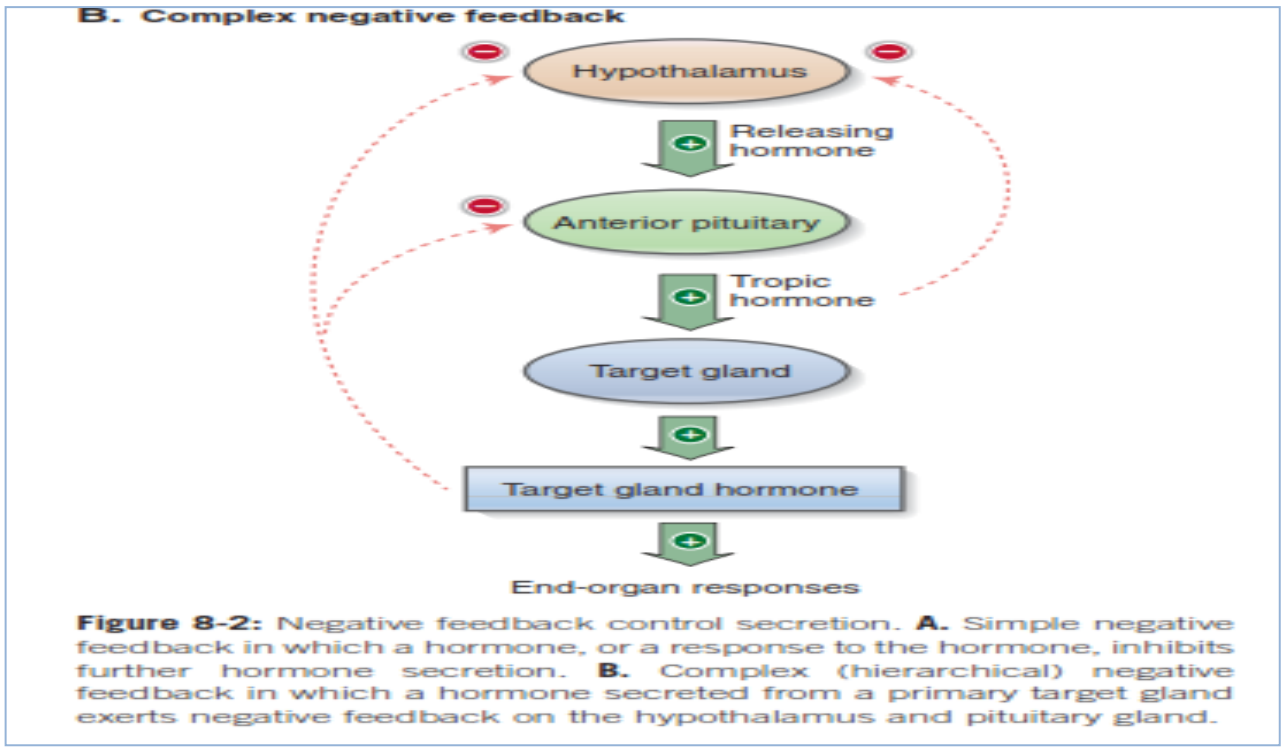
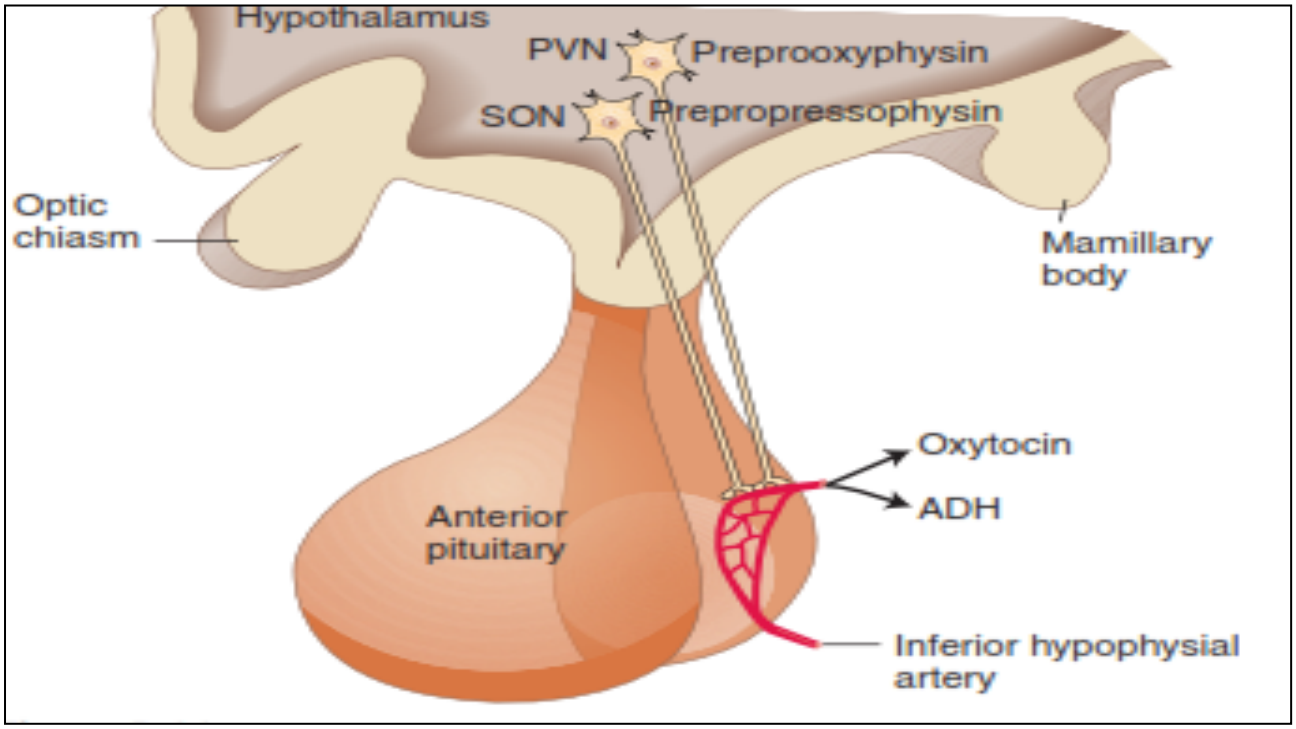


Figure 8-2: Negative feedback control secretion. **A.** Simple negative feedback in which a hormone, or a response to the hormone, inhibits further hormone secretion. **B.** Complex (hierarchical) negative feedback in which a hormone secreted from a primary target gland exerts negative feedback on the hypothalamus and pituitary gland.

PITUITARY GLAND

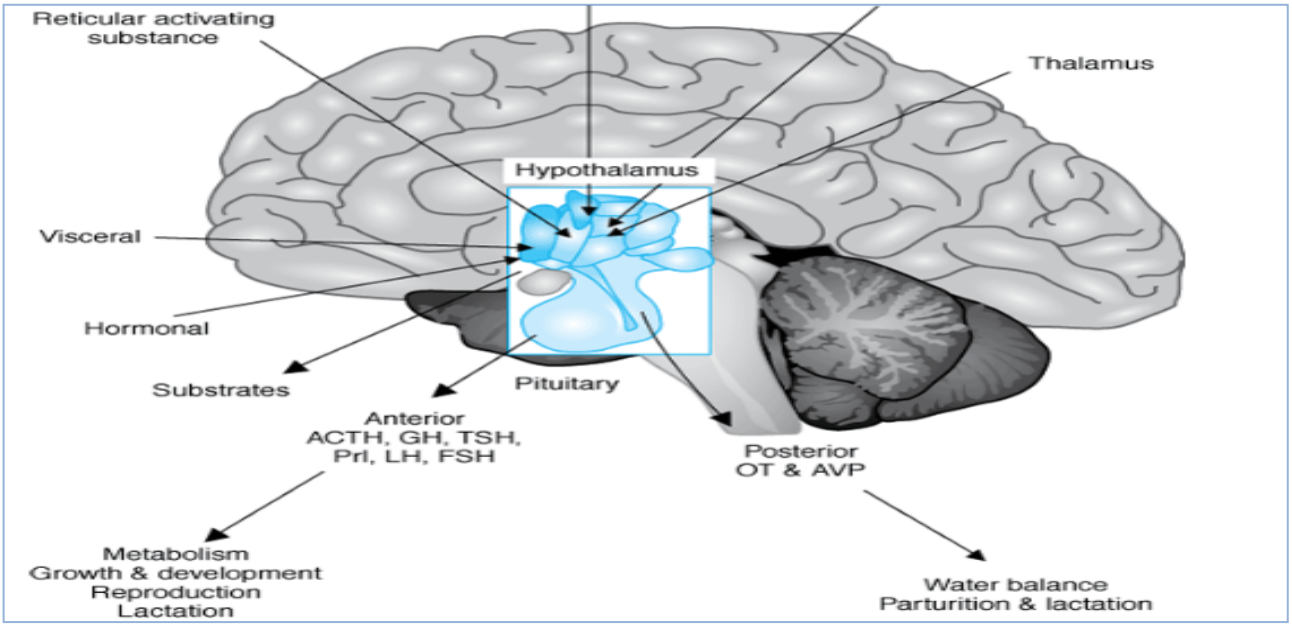


The pituitary gland or hypophysis, is a small endocrine gland located in a [bony cavity at the base of the brain just below the hypothalamus.
The pituitary is connected to the hypothalamus by a thin stalk, the infundibulum, which contains nerve fibers & small blood vessels.

The pituitary has 2 anatomically and functionally distinct lobes, the posterior & anterior pituitary.

- **Posterior pituitary** is composed of nervous tissue and thus is also termed the **neurohypophysis.**

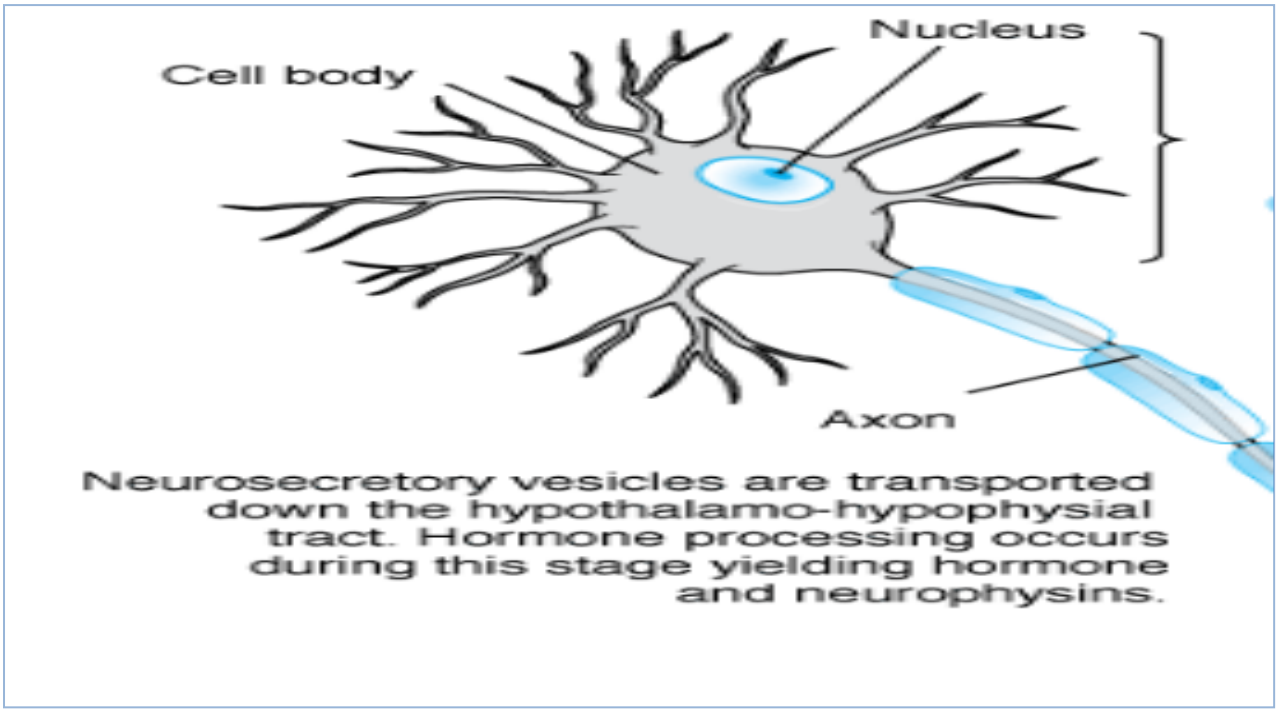
- **Anterior pituitary** consists of glandular epithelial tissue, so it is also known as **adenohypophysis**.



POSTERIOR PITUITARY GLAND

Functionally as well as anatomically, the posterior pituitary is simply an extension of the hypothalamus.

The posterior pituitary does not actually produce any hormones, it simply stores and, upon appropriate stimulation, releases in the blood two small peptide hormones (actually neurohormones), **VASOPRESSIN &OXYTOCIN**, which are both synthesized in **SUPRAOPTIC &PARA VENTRICULUAR NUCLEI**.



Neurohormones:

1- VASOPRESSIN (Anti-Diuretic hormone, ADH)

Have 2 major effects that correspond to its names

1-it enhances the retention of water by the kidneys (an anti-diuretic effect).

2-it causes contraction of smooth muscle arterioles (a vessel pressor effect).

2- OXYTOCIN

1-stimulates contraction of the uterine smooth muscle to aid in expulsion of the fetus during parturition.

2-it promotes ejection of the milk from the mammary glands (breasts) during breasts feeding.