



Clinical Endocrinology

Hypothalamus Hormones And Releasing Factors

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كلية التقنيات الصحية والطبية

قسم تقنيات المختبرات الطبية

المرحلة الثالثة

محاضرة رقم 4

Lecture No. 4

الجانب النظري

Theoretical

.Third . Stage

تدريسي المادة : م.م عقيل محمد رسول

The hypothalamus produces two types of endocrine factors;

(a) the hypothalamic neuropeptides

(b) the hypothalamic releasing factors. The releasing factors are **inhibitory neuro-secretions** *synthesized* in the hypothalamus and **released** through **the hypothalamic pituitary portal circulation**. They have their effect on the secretion of pituitary tropic hormones

1. HYPOTHALAMIC NEUROPEPTIDES

- The hypothalamic neuropeptides are **produced** by the **supraoptic and Para ventricular nuclei** of the hypothalamus.
- These neurohormones are **vasopressin** [**anti-diuretic hormone (ADH)**] and **oxytocin**.
- **The precursors of ADH and oxytocin are long polypeptides.** They are **synthesized** in hypothalamus.

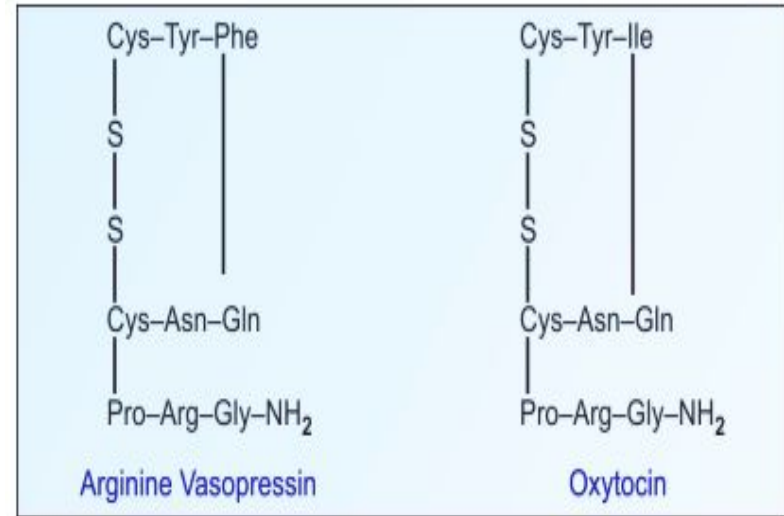
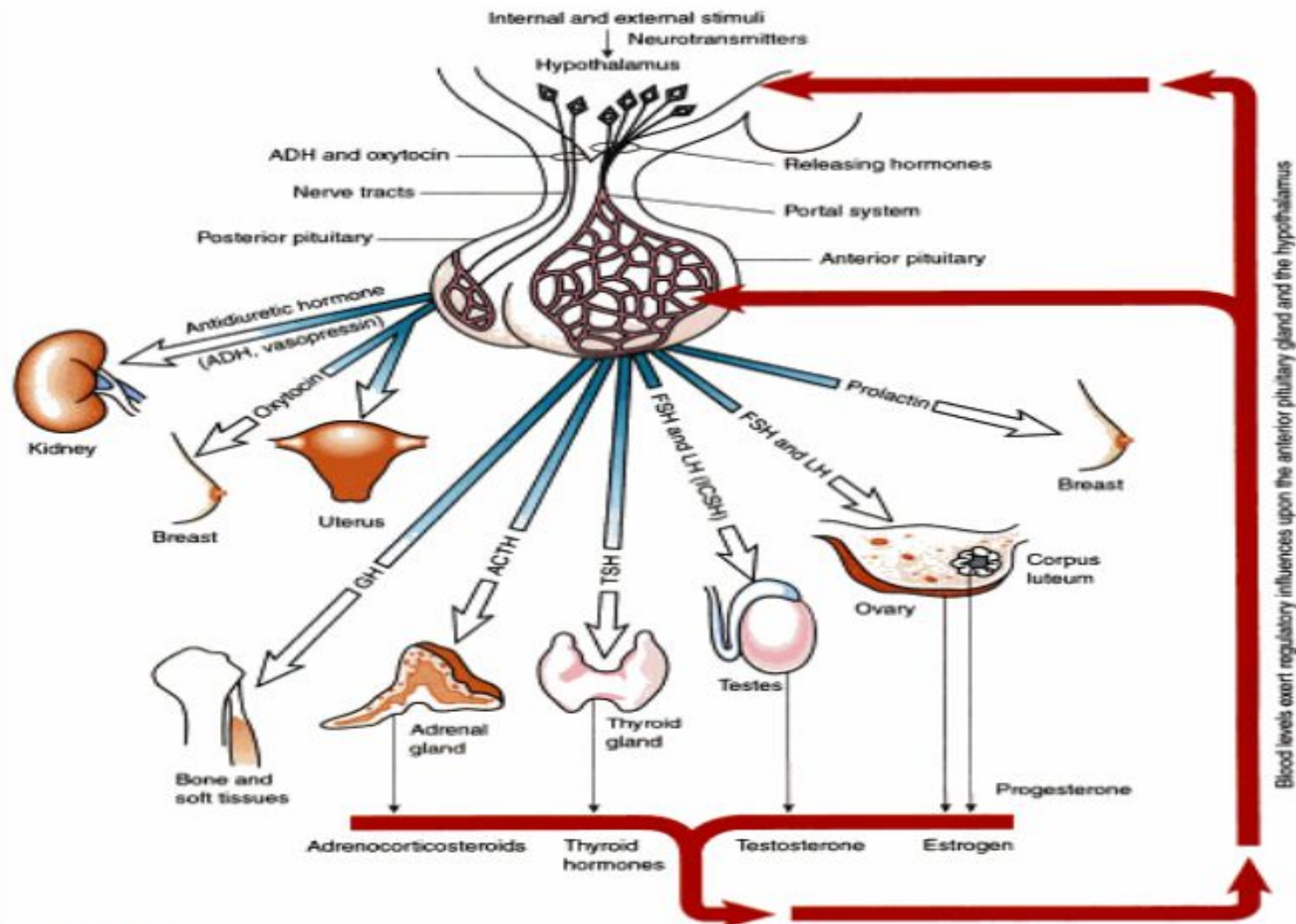


Fig. 51.1: Structure of ADH and oxytocin



2. Hypothalamic Releasing Factors

- The secretion of hormones by **adenohypophysis or anterior pituitary** is *under the control of peptides secreted by* hypothalamus. Several peptides **having effects** on anterior pituitary, either **stimulant** (releasing factors), **or inhibitory**, have been identified.
- The secretion of the hypothalamic peptides is also **under the feedback control** of anterior pituitary tropic hormones (short loop feedback) as well as the target gland hormones.

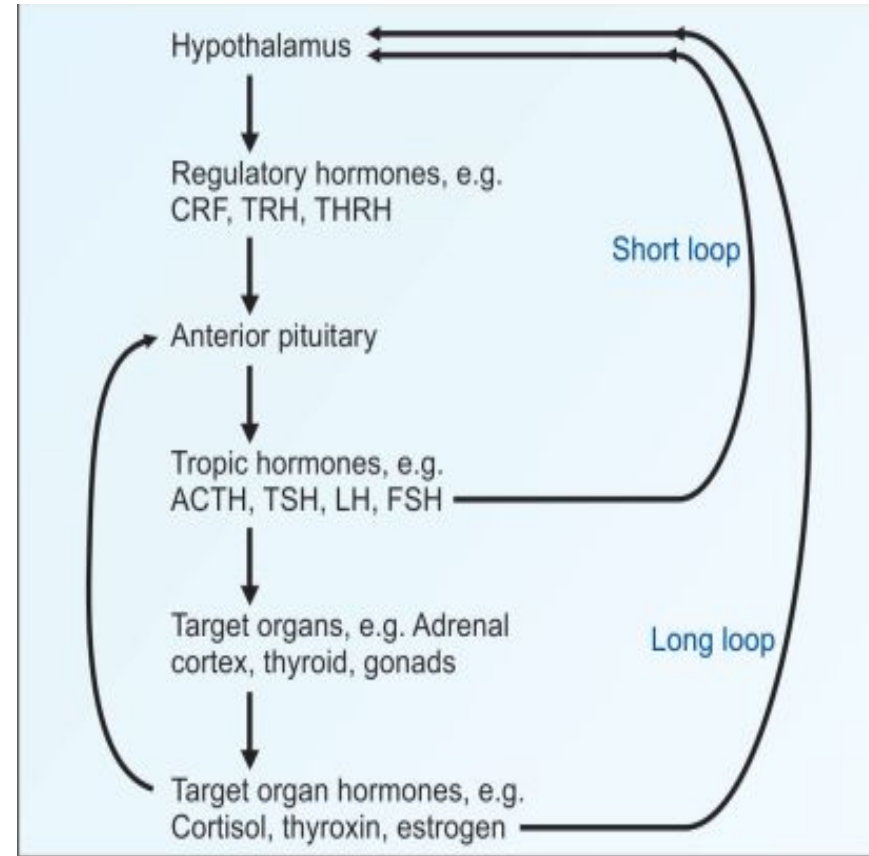
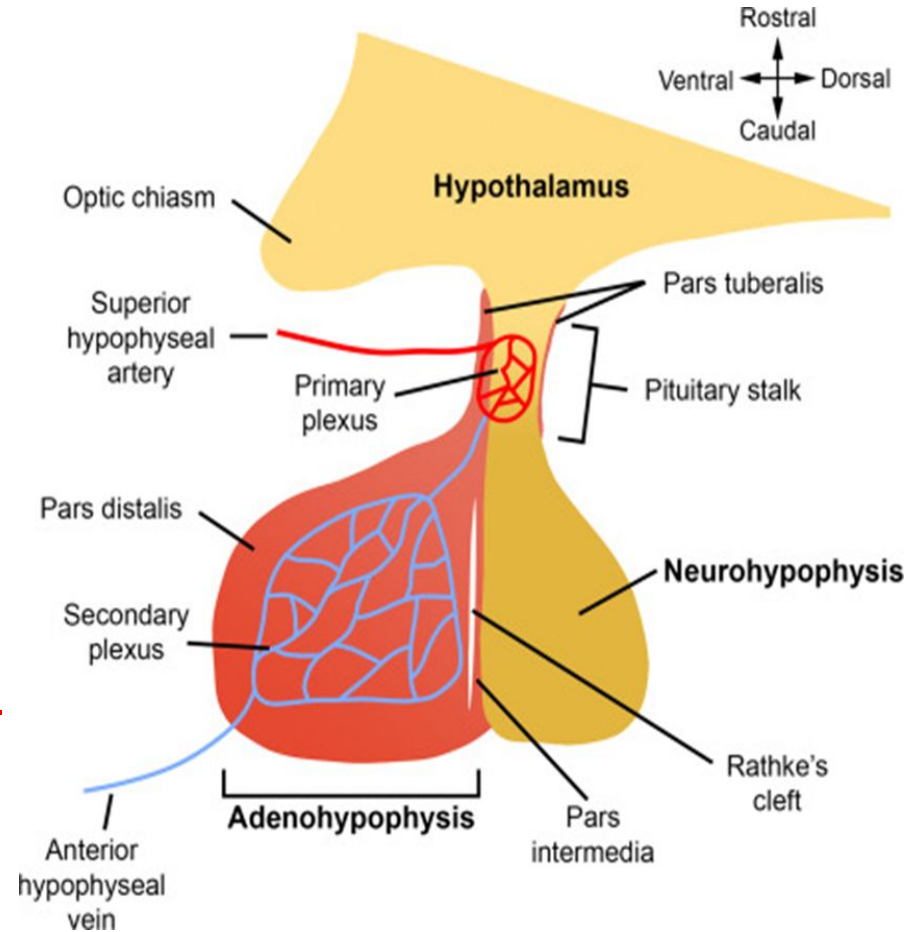


Fig. 51.2: Long and short loops of feedback

The median eminence of the hypothalamus is connected directly to the **pituitary stalk**. Within this stalk is a portal system of blood vessels required to **maintain normal secretory activity of the pituitary gland**. The activities of the cells of the anterior lobe are **controlled by** the **nerve cells** of the hypothalamus which **send axons to the capillary beds**. The nerve endings **liberate** chemical substances, **hypothalamic releasing factors or hormones**. At present **10 discrete regulatory factors** have been described that may affect the **synthesis** as well as **secretion of specific pituitary hormone**



- Four hypothalamic- releasing hormones (GHRH, corticotropin- releasing hormone [CRH], thyrotropinreleasing hormone [TRH], and gonadotropin-releasing hormone [GnRH]) **traverse** the **hypothalamic portal vessels** and impinge upon their respective transmembrane **trophic hormone-secreting cell receptors**.
- These distinct cells express GH, ACTH, TSH, and gonadotropins, respectively.
- In contrast, hypothalamic **somatostatin and dopamine suppress** تثبيط GH or PRL and TSH secretion, respectively.

3. Hormones Of Anterior Pituitary

- The anterior pituitary hormones are **tropic in nature**, *stimulating the secretion of hormones from target organs*.
- Secretions of all these hormones are **under the control of hypothalamic releasing or inhibitory factors**.

Major hypothalamic releasing factors

Name	Chemical nature	Biological actions
TRH; thyrotropin releasing hormone	Tripeptide; (pyro-Glu-His-Pro-NH ₂)	Induces secretion of TSH and PRL; neuromodulator
GnRH; gonadotropin releasing hormone	Biologically active portion is a decapeptide	Releases LH and FSH; induces spermatogenesis, ovulation and testosterone
GHRH; growth hormone releasing hormone	37–44 amino acid; amino terminal end is tyrosine	Stimulates growth hormone secretion
CRF; corticotropin releasing factor	Amidated peptide with 41 amino acids	Release of ACTH. Inhibited by cortisol
Somatostatin; growth hormone inhibitory factor)GHIH)	Cyclic peptide with 14 amino acids	Inhibits secretion of GH and TSH. Inhibits gut hormones, pancreatic and gastric secretion
PIF; prolactin inhibitory factor	Dopamine	Inhibits PRL release

Questions: Hypothalamus Hormones

A patient presents with symptoms of excessive growth (acromegaly) due to .1 a pituitary tumor. The overproduction of Growth Hormone (GH)?

- a) Somatostatin (GHIH)
- b) Corticotropin-Releasing Hormone (CRH)
- c) Growth Hormone-Releasing Hormone (GHRH)
- d) Thyrotropin-Releasing Hormone (TRH)

The "master regulatory" relationship between the hypothalamus and the .2 anterior pituitary is a classic example of hormonal control.?

- a) They are secreted into the pancreatic duct.
- b) They travel through neuronal axons directly into the posterior pituitary.
- c) They are released into the hypophyseal portal system.
- .d) They diffuse passively through the brain tissue

A key diagnostic test involves injecting Thyrotropin-Releasing Hormone .3 (TRH) and measuring the pituitary's response. Which of the following pairs of hormones does TRH directly stimulate the release of?

- a) Prolactin (PRL) and Thyroid-Stimulating Hormone (TSH)
- b) Luteinizing Hormone (LH) and Follicle-Stimulating Hormone (FSH)
- c) Growth Hormone (GH) and Adrenocorticotrophic Hormone (ACTH)
- d) Oxytocin and Antidiuretic Hormone (ADH)

The hypothalamus produces two hormones that are stored and released .4 by the posterior pituitary. What are these two hormones?

- a) Prolactin and Oxytocin
- b) Growth Hormone and Vasopressin
- c) Prolactin (PRL) and Thyroid-Stimulating Hormone (TSH)
- d) Oxytocin and Antidiuretic Hormone (ADH/Vasopressin)

Learning Resources for Hormone Mechanisms

Here are excellent sources to deepen your understanding of this topic:

Medical Textbooks:

"Harper's Illustrated Biochemistry" (Chapter on Hormones & Signal Transduction): Provides a detailed, yet clear, biochemical perspective on second messenger systems.

"Guyton and Hall Textbook of Medical Physiology" (Chapter 74: Introduction to Endocrinology): Excellent for understanding the physiological principles of hormone-receptor interactions and signaling.

"Greenspan's Basic & Clinical Endocrinology": A comprehensive resource that links basic mechanisms to clinical practice.

YouTube Channels:

Armando Hasudungan: His detailed drawings are fantastic for visualizing signal transduction pathways.

Dr. Najeeb Lectures: Provides extremely detailed lectures on the entire process.