



ENDOCRINE

ANATOMY

3



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Quick recap:

Pituitary gland has 2 lobes: Adenohypophysis-anterior (which has 3 parts: Pars tuberalis, Pars intermedia and Pars distalis) & Neurohypophysis-posterior lobe.

Neurohypophysis is an extension for hypothalamus which secretes ADH & Oxytocin, and Adenohypophysis secretes different hormones.

ADENOHYPOPHYSIS-MAJOR CELL TYPE

Cell Type	% of Total Cells	Hormone Produced	Major Function
Somatotrophs	50	Somatotropin (growth hormone, GH), a 22-kDa protein	Stimulates growth in epiphyseal plates of long bones via insulin-like growth factors (IGFs) produced in liver
Lactotrophs (or mammotrophs)	15-20	Prolactin (PRL), a 22.5-kDa protein	Promotes milk secretion
Gonadotrophs	10	<u>Follicle-stimulating hormone (FSH)</u> and <u>luteinizing hormone (LH)</u> ; interstitial cell-stimulating hormone [ICSH] in men), both 28-kDa glycoprotein dimers, secreted from the same cell type	FSH promotes ovarian follicle development and estrogen secretion in women and spermatogenesis in men; LH promotes ovarian follicle maturation and progesterone secretion in women and interstitial cell androgen secretion in men
Thyrotrophs	5	Thyrotropin (TSH), a 28-kDa glycoprotein dimer	Stimulates thyroid hormone synthesis, storage, and liberation
Corticotrophs	15-20	Adrenal corticotropin (ACTH), a 4-kDa polypeptide Lipotropin (LPH)	Stimulates secretion of adrenal cortex hormones Helps regulate lipid metabolism

These cells are found mainly in pars distalis, therefore pars distalis has the main function. We must memorize all the cells, hormones they produce and the functions.

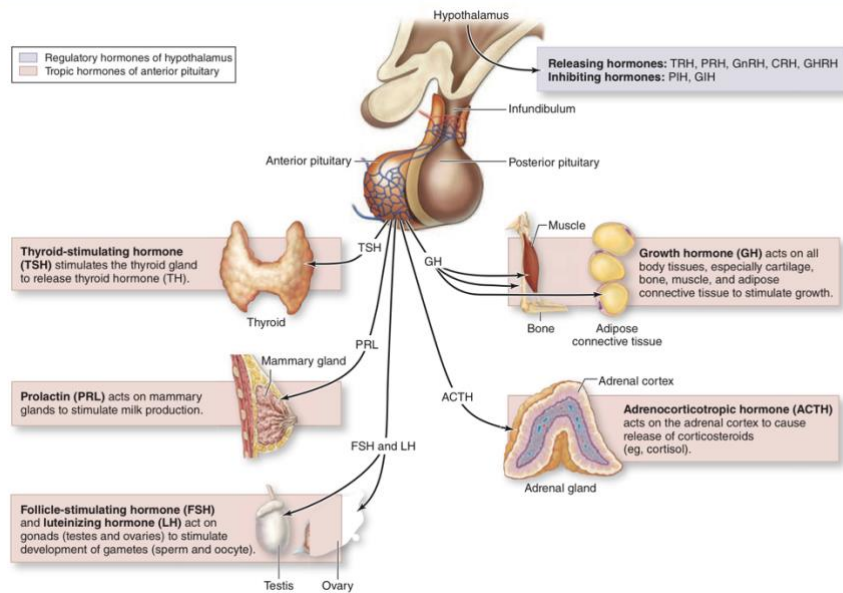
Many cells have receptors for these hormones.

- POMC in pars distalis: adrenocortical trophic hormone (ACTH) and β -lipotropin(β -LPH).

- Somatotropin work on epiphyseal plate of long bones, hyaline cartilage that change to long bone, Growth hormone work on proliferation and differentiation of osteoblasts. Therefore, sometimes it's given for elongation. 😊
- Prolactin works on mammary glands on breast, increasing after delivery.
- Gonadotrophs cells only one one gives us two hormones: LH & FSH
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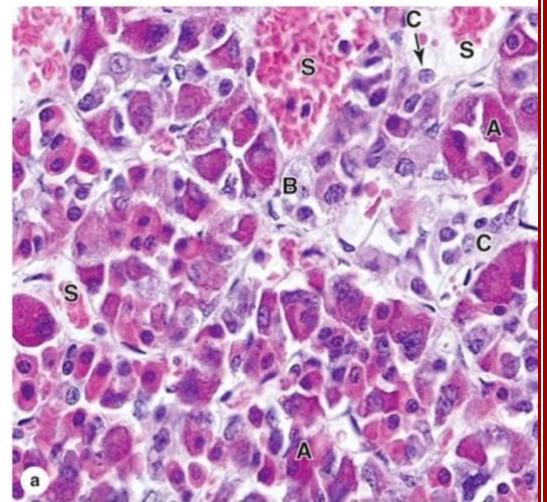
PARS DITALIS

- **Biggest (75%) of Adenohypophysis**
- **Has a thin fibrous capsule**
- **Cords (خلايا متشابهة بجانب بعضها) of well-stained endocrine cells interspersed with fenestrated capillaries and supporting reticular connective tissue.**
These capillaries are the 2nd set of portal system; the 1st is beside the hypothalamus.
- **Chromophils (hormones attract stains and have many vessels around) and chromophobes (usually have no attraction forward stains and less vessels).**
- **Chromophils are secretory cells.**
- **Chromophils: hormone is stored in cytoplasmic granules.... basophils and acidophils.**
- **Acidophils: somatotrophs and lactotrophs.**
- **Basophils: corticotrophs, gonadotrophs, and thyrotrophs**



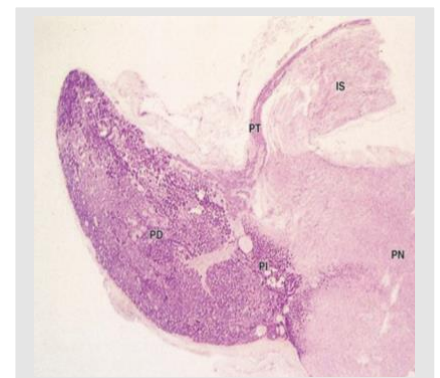
For special stain for hormones, we use special stain as immunogold with electron microscope. We can see two types of cells one attracts stains (chromophills), and others don't also round the cells for supporting we find some reticulum tissue. Chromophills can be acidophilus and produce prolactin & growth hormone.

acidophil cells (A), basophils (B), and Chromophobes(C). We will study more histological pic in practical classes. إن شاء الله



PARS TUBERALIS

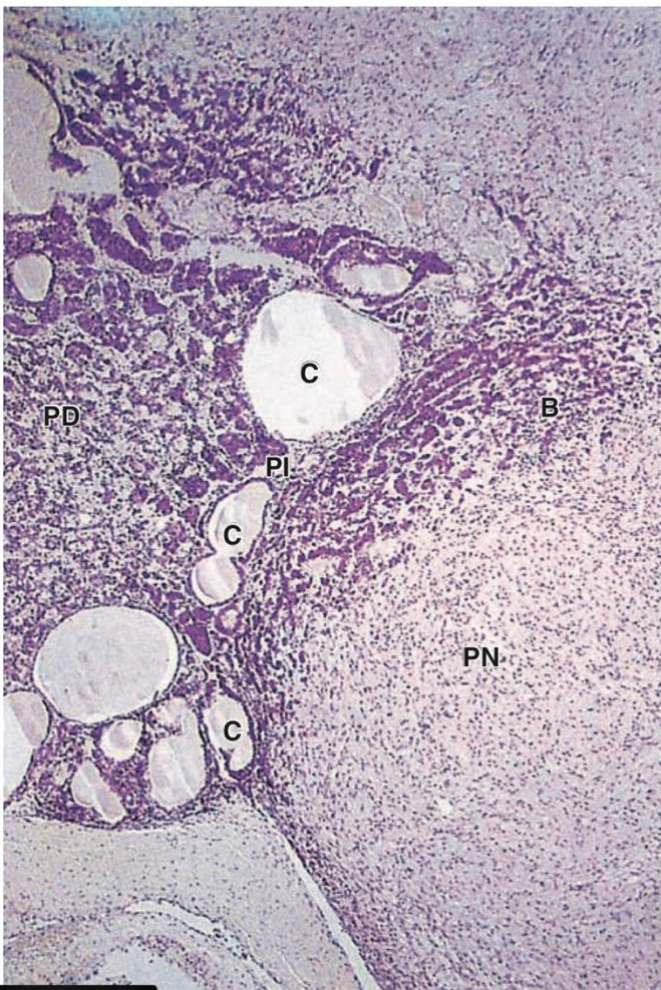
- **Small funnel-shaped region surrounding the infundibulum.**
- **Most of the cells of the are gonadotrophs.**
- This part wraps the infundibulum, and has less cells (tuberalis & intermedia share 25% of adenohypophysis)



PARS INTERMEDIA

- A narrow zone lying between pars distalis and pars nervosa.
- Contains basophils (corticotrophs), chromophobes, and small, colloid-filled cysts derived from the lumen of the embryonic hypophyseal pouch.
- Best-developed and active during fetal life.
- Unique function: Express POMC (pro-opiomelanocortin)- but cleave it differently from cells in the pars distalis - which are ((MSH), γ -LPH, and β -endorphin).

Melano-stimulating hormone from melanocytes in skins, more MSH increases the activity of these cells which lead to darker color, not increasing the cells number.



The pars intermedia (PI) is a narrow region lying between the pars distalis (PD) and the pars nervosa (PN), with many of its basophils (B) often invading the latter. Remnants of the embryonic hypophyseal pouch's lumen are usually present in this region as colloid-filled cysts (C) of various sizes. Function of this region in humans is not clear.

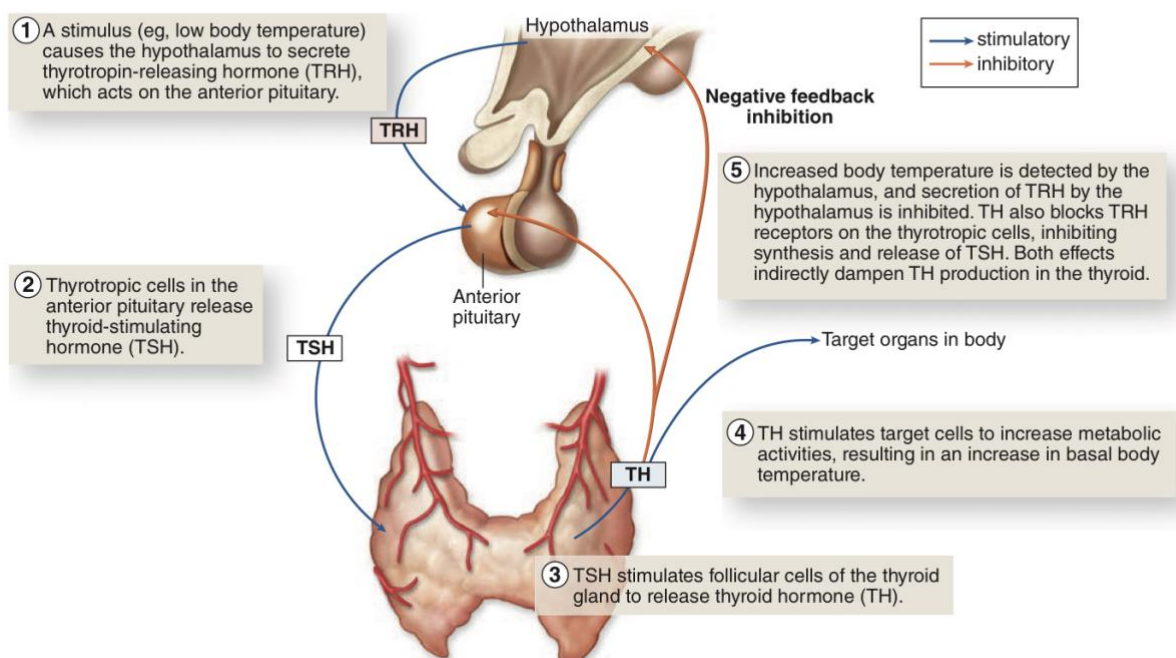
HYPOTHALAMIC HORMONES

Hormone	Chemical Form	Functions
Thyrotropin-releasing hormone (TRH)	3-amino acid peptide	Stimulates release of thyrotropin (TSH)
Gonadotropin-releasing hormone (GnRH)	10-amino acid peptide	Stimulates the release of both follicle-stimulating hormone (FSH) and luteinizing hormone (LH)
Somatostatin	14-amino acid peptide	Inhibits release of both somatotropin (GH) and TSH
Growth hormone-releasing hormone (GHRH)	40- or 44-amino acid polypeptides (2 forms)	Stimulates release of GH
Dopamine	Modified amino acid	Inhibits release of prolactin (PRL)
Corticotropin-releasing	41-amino acid polypeptide	Stimulates synthesis of pro-opiomelanocortin (POMC) and release of both β -lipotropic

- Releasing & inhibitor hormones from hypothalamus that go to anterior lobe pituitary gland through blood (primary set capillaries)
- Only 2 inhibitory hormones: dopamine & somatostatin.
- How to control hormones? By the negative feedback system.

Extra: here a picture from the book 😊 for understanding

FIGURE 20–10 Negative feedback loops affecting anterior pituitary secretion.



Questions

1. Acidophils cells of the pituitary secretes:
 - A. GH
 - B. TSH
 - C. ACTH
 - D. LH
2. Which of the following is NOT a hormone produced by the pituitary gland?
 - A. Growth hormone
 - B. Prolactin
 - C. Estrogen
 - D. Thyroid stimulating hormone.
3. FSH is produced by:
 - a. Thyroid gland
 - b. Anterior pituitary gland
 - c. Gonads
4. Which of the following is an accumulation and releasing centre of neurohormone?
 - a. Anterior pituitary gland
 - b. Posterior pituitary gland
 - c. Hypothalamus
5. MSH is produced by:
 - a. Anterior lobe of the pituitary gland
 - b. Posterior pituitary gland
 - c. Parathyroid
 - d. Pars intermedia of pituitary gland

Answers:

1. A
2. C
3. B
4. B
5. D

V2

Wrong: Somatotropin work on epiphyseal plate of long bones, hyaline cartilage that change to long bone, Growth hormone work on proliferation and differentiation of chondrocytes. Therefore, sometimes it's given for elongation.

Right: Somatotropin work on epiphyseal plate of long bones, hyaline cartilage that change to long bone, Growth hormone work on proliferation and differentiation of osteoblasts. Therefore, sometimes it's given for elongation.