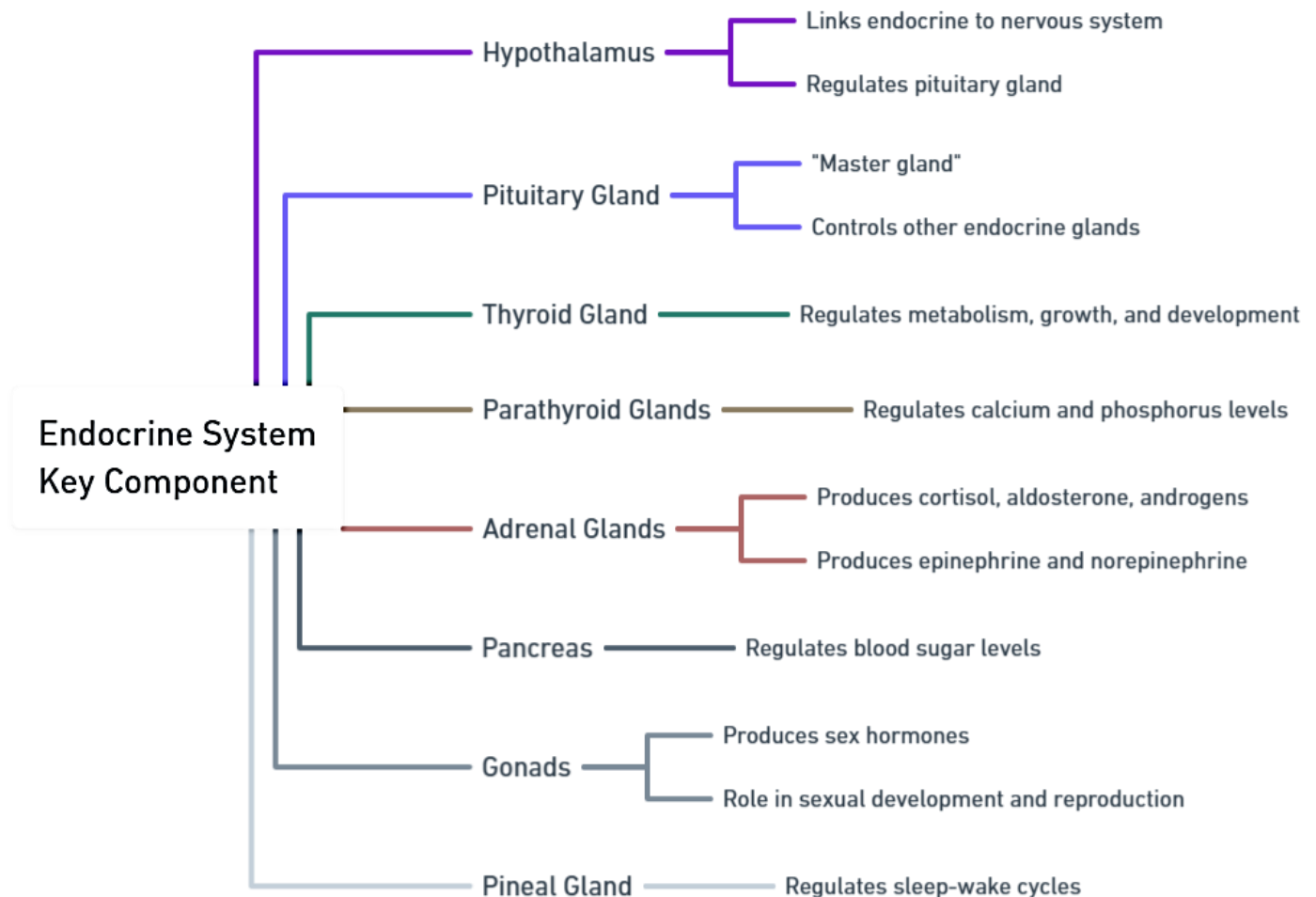


Endocrine system

Endocrine System: Introduction

- The **endocrine system** is a highly coordinated network of **glands and organs** responsible for producing, storing, and secreting **hormones**—chemical messengers that regulate essential physiological processes such as **growth, metabolism, reproduction, and stress response**.
- It plays a **vital role in maintaining homeostasis** and works in close collaboration with the **nervous system** to coordinate body functions.

Key Components of the Endocrine System



1. Hypothalamus

- **Location:** Brain
- **Function:**
 - Acts as a bridge between the nervous and endocrine systems.
 - Produces **releasing and inhibiting hormones** that control the secretion of hormones from the **pituitary gland**.

2. Pituitary Gland ("Master Gland")

- **Location:** Base of the brain, beneath the hypothalamus
- **Function:**

- Releases hormones that regulate other endocrine glands.
- Controls growth, metabolism, reproductive functions, and water balance.

3. Thyroid Gland

- **Location:** Neck, in front of the trachea
- **Function:**
 - Produces **thyroid hormones (T3 and T4)**.
 - Regulates **metabolism, growth, and development**.

4. Parathyroid Glands

- **Location:** Four small glands on the back of the thyroid gland
- **Function:**
 - Secrete **parathyroid hormone (PTH)**.
 - Regulate **calcium and phosphorus** levels in the blood and bones.

5. Adrenal Glands

- **Location:** On top of each kidney
- **Structure & Function:**
 - **Adrenal Cortex:** Produces hormones like **cortisol** (stress response), **aldosterone** (sodium and water balance), and **androgens** (sex hormones).
 - **Adrenal Medulla:** Secretes **epinephrine and norepinephrine**, which are involved in the **fight-or-flight** response.

6. Pancreas

- **Location:** Behind the stomach
- **Function:**
 - Acts as both an **endocrine** and **exocrine** gland.
 - Endocrine function includes secretion of **insulin** and **glucagon**, which regulate **blood glucose levels**.

7. Gonads (Sex Glands)

- **Testes (Males) and Ovaries (Females)**
- **Function:**
 - Produce **sex hormones**:
 - **Testosterone** (in males)
 - **Estrogen and Progesterone** (in females)
 - Regulate **sexual development, reproduction, and secondary sexual characteristics**.

8. Pineal Gland

- **Location:** Deep within the brain
- **Function:**

- Secretes **melatonin**, a hormone that regulates the **sleep-wake cycle (circadian rhythm)**.

Hormones

- **Hormones** are chemical messengers produced by **endocrine glands** and secreted into the bloodstream to regulate various physiological processes.
- They help maintain **homeostasis**, control **growth, metabolism, reproduction, stress response**, and **sleep cycles**.
- Hormones act on specific **target cells or organs** that have receptors for them.

Functions of hormones

1. Growth and Development

- Hormones: **Growth hormone (GH), Insulin-like growth factor (IGF), Thyroid hormones**
- Role: Promote cell growth, tissue repair, and differentiation.

2. Metabolism

- Hormones: **Insulin, Glucagon, Thyroid hormones**
- Role: Regulate metabolism of carbohydrates, proteins, and lipids.

3. Reproduction

- Hormones: **Estrogen, Progesterone, Testosterone**
- Role: Control menstrual cycle, pregnancy, and sexual development.

4. Stress Response

- Hormones: **Cortisol, Epinephrine, Norepinephrine**
- Role: Mobilize energy and elevate heart rate and blood pressure.

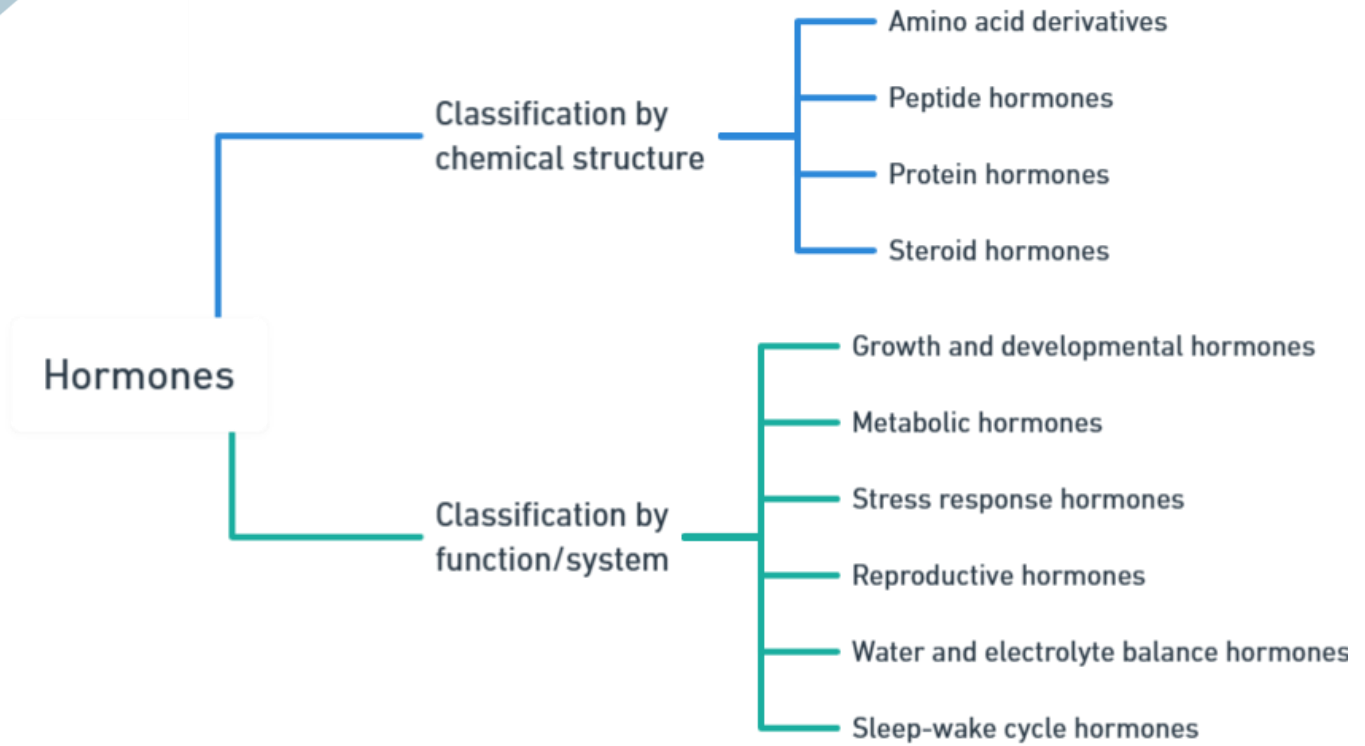
5. Water and Electrolyte Balance

- Hormones: **Aldosterone, Antidiuretic hormone (ADH)**
- Role: Regulate fluid and salt balance in the body.

6. Sleep-Wake Cycles

- Hormone: **Melatonin**
- Role: Controls circadian rhythms and sleep patterns.

Classification of hormones



By Chemical Structure

1. Amino Acid Derivatives

- Examples: **T3, T4, Epinephrine, Dopamine, Melatonin**

2. Peptide Hormones

- Short amino acid chains
- Examples: **Insulin, Glucagon, ADH**

3. Protein Hormones

- Long amino acid chains
- Examples: **FSH, LH, hCG**

4. Steroid Hormones

- Derived from cholesterol
- Examples: **Cortisol, Aldosterone, Testosterone, Estrogen, Progesterone**

By Function

Category	Hormones
Growth & Development	GH, IGF, Thyroid hormones
Metabolism	Insulin, Glucagon, Thyroid hormones
Reproduction	Estrogen, Progesterone, Testosterone, FSH, LH
Stress Response	Cortisol, Epinephrine, Norepinephrine
Water/Electrolyte Balance	Aldosterone, ADH
Sleep-Wake Cycle	Melatonin

Pituitary Gland (Master Gland)

Location: Base of the brain, below the hypothalamus.

Parts: Divided into two lobes:

- **Anterior pituitary (adenohypophysis)**
- **Posterior pituitary (neurohypophysis)**

Anterior Pituitary Hormones:

1. Growth Hormone (GH):

- **Function:** Stimulates growth of bones, muscles, and tissues; increases protein synthesis and fat breakdown.
- **Disorders:** Excess → Gigantism (in children), Acromegaly (in adults); Deficiency → Dwarfism.

2. Thyroid-Stimulating Hormone (TSH):

- **Function:** Stimulates the thyroid gland to produce thyroid hormones (T3, T4).

3. Adrenocorticotrophic Hormone (ACTH):

- **Function:** Stimulates adrenal cortex to release cortisol and other glucocorticoids.

4. Follicle-Stimulating Hormone (FSH):

- **Function:**
 - In females: Stimulates follicle growth and estrogen production in ovaries.
 - In males: Stimulates sperm production in testes.

5. Luteinizing Hormone (LH):

- **Function:**
 - In females: Triggers ovulation and formation of the corpus luteum.
 - In males: Stimulates testosterone production.

6. Prolactin (PRL):

- **Function:** Promotes milk production in the mammary glands.

Posterior Pituitary Hormones:

1. Antidiuretic Hormone (ADH or Vasopressin):

- **Function:** Promotes water reabsorption in kidneys; decreases urine volume; increases blood pressure.

2. Oxytocin:

- **Function:** Stimulates uterine contractions during childbirth and milk ejection during breastfeeding; involved in bonding and emotional connection.

Disorders of Pituitary gland



FREE PREVIEW

[Click here to visit our website](#)

PHARMACY PREMIUM NOTES

Complete subject
and semesters are
available on
FirstHope app only.



[Scan or click here](#)

Click here to get the app



Available on Google Play

JOIN THE FIRSTHOPE COMMUNITY

Join our Telegram channel

Click here to join Telegram



[Scan or click here](#)

@FirstHopeNotes

Instagram

@firsthope.official

[Click here to follow >](#)

YouTube channel

FirstHope-Pharmacy / Live streams

[Click here to watch >](#)

WhatsApp channel

Follow FirstHope on WhatsApp

[Click here to join >](#)

FirstHope website

firsthopenotes.com

[Click here to visit >](#)

B.Pharm / D.Pharm / M.Pharm / Pharm.D

Preview notes. Complete subjects and semesters in the FirstHope app.