🩺 Endocrine System Overview

Brief Overview

This note covers **the endocrine system** and was created from a 53-page PDF. It provides a concise map of the main glands, their primary hormones, and how they coordinate growth, metabolism, and reproduction.

Key Points

- Gland locations and the hormones they secrete
- Hormonal regulation of the brain, pituitary, and reproductive axes
- Common endocrine disorders and their clinical features
- Essential visual aids and reference links for deeper study

🧠 Endocrine System Overview

> The endocrine system consists of glands that **secrete hormones** directly into the bloodstream, influencing metabolism, growth, development, mood, and reproduction.

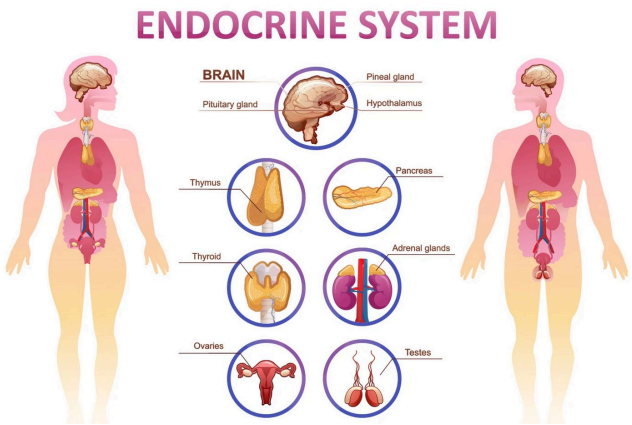
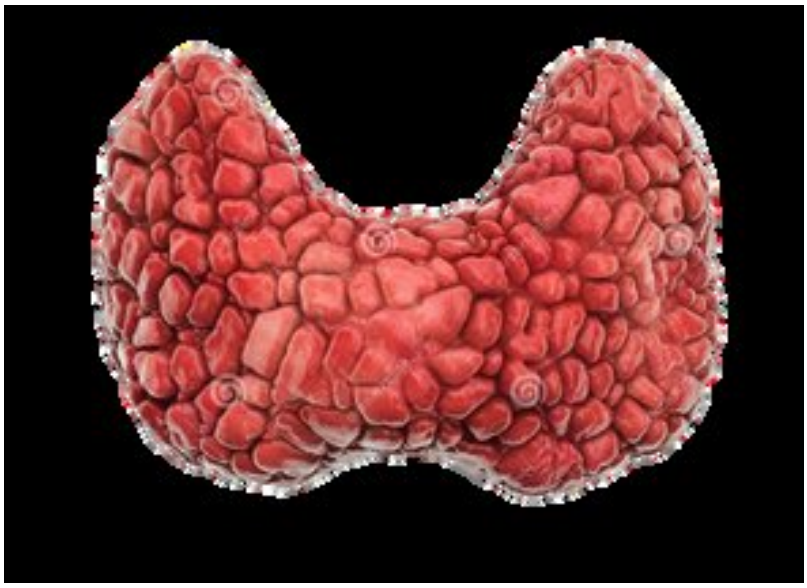


Diagram shows the brain, pituitary, pineal, hypothalamus, thymus, pancreas, thyroid, adrenal glands, ovaries, and testes.

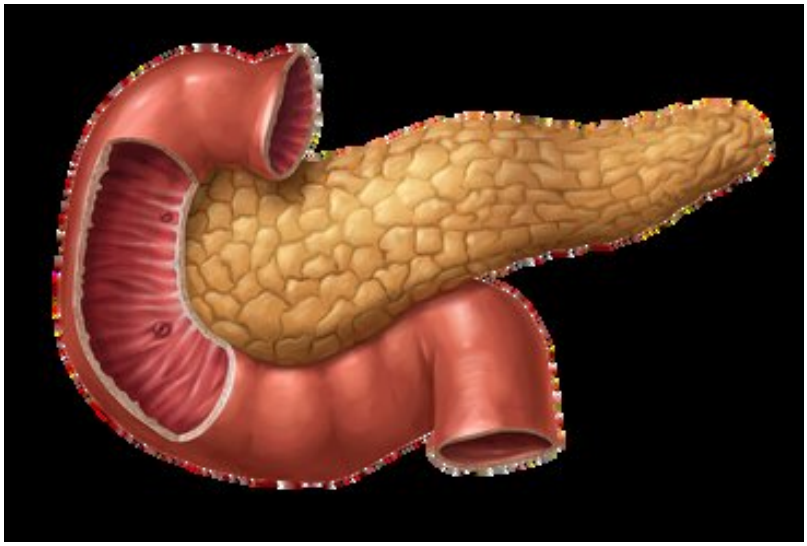
🔬 Major Endocrine Glands & Primary Hormones

Gland	Location	Main Hormones	Primary Functions
Pituitary (hypophysis)	Base of brain	Growth Hormone (GH), Prolactin (PRL), LH, FSH, ACTH, ADH, Oxytocin, TSH	Regulates growth, lactation, reproduction, stress response, water balance, uterine contractions
Pineal	Midbrain	Melatonin	Controls circadian rhythms (sleep-wake cycle)
Hypothalamus	Below thalamus	CRH, GnRH, ADH, oxytocin (via pituitary)	Links nervous system to endocrine; regulates stress, reproduction, water balance
Thyroid	Neck (below larynx)	Thyroxine (T4), Triiodothyronine (T3)	Regulates basal metabolic rate
Parathyroid	Posterior thyroid	Parathormone (PTH)	Maintains blood calcium levels
Thymus	Anterior mediastinum	Thymosin	Stimulates T-cell development (immune function)
Pancreas	Abdomen (behind stomach)	Insulin, Glucagon	Lowers (insulin) or raises (glucagon) blood glucose
Adrenal Cortex	Top of kidneys	Cortisol, Aldosterone	Metabolism, blood pressure, stress response
Adrenal Medulla	Center of adrenal gland	Adrenaline (epinephrine), Noradrenaline	“Fight-or-flight” response
Ovaries	Pelvis	Estrogen, Progesterone	Female reproductive cycle,

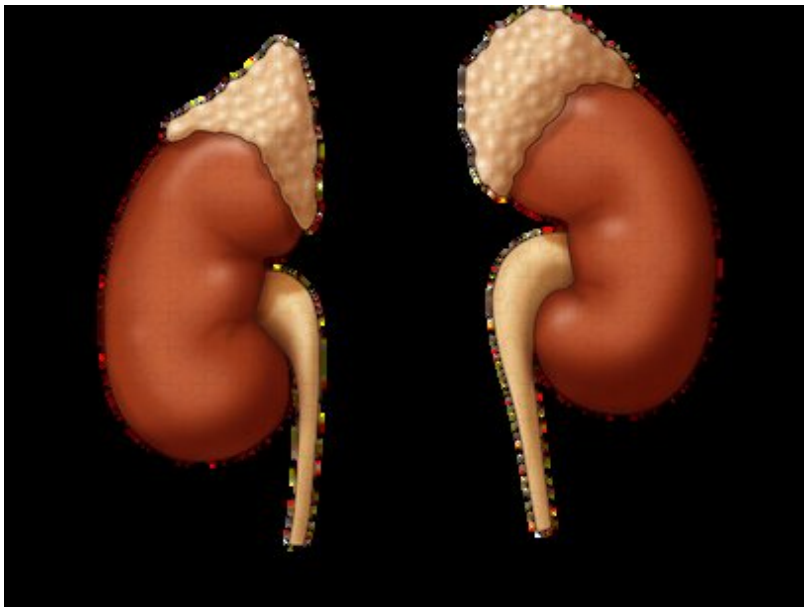
			secondary sex characteristics
Testes	Scrotum	Testosterone	Male sexual development, sperm production



The thyroid's two lobes are joined by an isthmus; it produces T3 and T4.



The pancreas lies behind the stomach and releases insulin and glucagon.



Kidneys with adrenal glands perched atop each.

🧪 Hormones of the Brain & Pituitary

> **Melatonin** – regulates the 24-hour internal clock and promotes sleep.

> **Antidiuretic Hormone (ADH)** – conserves water, influencing blood pressure.

> **Corticotropin-releasing hormone (CRH)** – stimulates ACTH release, affecting metabolism and immune response.

> **Gonadotropin-releasing hormone (GnRH)** – triggers LH and FSH release, essential for reproductive function.

> **Oxytocin** – induces uterine contractions and milk ejection.

> **Growth Hormone (GH)** – maintains body structure, protein synthesis, and metabolism.

> **Prolactin (PRL)** – promotes breast development and milk production.

> **Luteinizing Hormone (LH)** – stimulates testosterone in males; triggers ovulation in females.

> **Follicle-Stimulating Hormone (FSH)** – supports sperm maturation; stimulates ovarian follicle growth.

> **Adrenocorticotropic Hormone (ACTH)** – promotes cortisol release from the adrenal cortex.

> **Thyroid-Stimulating Hormone (TSH)** – activates thyroid hormone synthesis.

🦋 Reproductive Hormone Regulation

♂️ Male Reproductive System

1. **Hypothalamus** releases **GnRH** →
2. **Pituitary** secretes **LH** and **FSH**.
    - **FSH** → stimulates **Sertoli cells** → produce **Androgen-Binding Protein (ABP)**, which binds testosterone to support **spermatogenesis**.
    - **LH** → stimulates **Leydig cells** → secrete **testosterone**.

> **Testosterone**: drives sperm maturation and secondary male characteristics.

♀️ Female Reproductive System

1. **Hypothalamus** releases **GnRH** →
2. **Pituitary** secretes **LH** and **FSH**.
    - **FSH** → stimulates ovarian follicles → produce **estrogen**.
    - **Estrogen** → promotes **oogenesis** and prepares the uterine lining.
    - **LH** → triggers **ovulation**; post-ovulation follicle (corpus luteum) produces **progesterone**.

> **Progesterone**: prepares the uterus for implantation and maintains early pregnancy.

🩺 Endocrine Disorders

Disorder	Affected Gland	Typical Hormonal Imbalance	Clinical Features
Osteoporosis	Parathyroid / Thyroid	Low calcium regulation (often due to excess PTH)	Brittle, porous bones
Goiter	Thyroid	Over- or under-production of T3/T4	Visible neck swelling
Gigantism	Pituitary (excess GH)	Excess growth hormone during childhood	Abnormally tall stature
Dwarfism	Pituitary (insufficient GH)	Deficient growth hormone	Short stature

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📚 References

- LRDMS Portal, Science Modules (2014) – accessed Oct 13 2019.
- Lumen Candela, *Hormonal Control of Human Reproduction* (2021).
- YouTube: “Endocrine System Overview” (https://www.youtube.com/watch?v=F3zx9AHTjy8).
- KidsHealth, “Endocrine System” (https://kidshealth.org/en/teens/endocrine.html).
- 3-D Model: https://g.co/kgs/LMzaDt.