



ChapterNotes

chapternotes.in · free NEET & JEE prep

CHAPTER NOTES

Chemical Coordination and Integration Class 11 Notes | CBSE Biology Chapter 19

- ✓ Chapter-wise notes & important questions
- ✓ Free gamified practice app — streaks, levels, revision
- ✓ Free mock & prediction papers with answer keys

Source: <https://chapternotes.in/cbse/class-11-biology/chemical-coordination-and-integration-class-11-notes/>



Scan to practice this chapter free in the app

Chemical Coordination and Integration Class 11 Notes | CBSE Biology Chapter 19

Chemical Coordination and Integration is Chapter 19 of CBSE Class 11 Biology — the chapter that explains how your body talks to itself without using nerves. Instead of electrical signals, it uses chemical messengers called **hormones**, secreted by ductless **endocrine glands** straight into the blood. Master this chapter and the entire endocrine system, its disorders, and the dozens of one-mark facts NEET loves become easy points.

By the end of these notes you will know every endocrine gland, the hormones it secretes and their target action, the hormones released by non-endocrine organs (heart, kidney, GI tract), how a hormone actually triggers a response inside a cell, and the classic hormonal disorders. This is a high-yield, fact-dense chapter carrying roughly 5–7 marks in boards and 2–3 guaranteed questions in NEET.

Table of Contents

- Key Concepts — endocrine glands, the human endocrine system, hormones of heart/kidney/GI tract, mechanism of hormone action, disorders
 - Weightage in Board & Entrance Exams
 - Important Definitions
 - Solved Examples & Fact Drills
 - Important Questions for Board Exams
 - Quick Revision Points
-

Key Concepts

1. Endocrine Glands and Hormones

Endocrine glands are ductless glands that pour their secretions — **hormones** — directly into the blood, which carries them to distant target organs. This is in contrast to **exocrine glands** (like salivary or sweat glands) that release secretions through ducts.

A **hormone** is a non-nutrient chemical that acts as an intercellular messenger and is effective in very small (micromolar or less) amounts. Only cells with the correct **receptor** for a hormone — the **target cells** — respond to it.

Chemical Nature of Hormones

- **Peptide/protein hormones:** insulin, glucagon, pituitary hormones — water-soluble, act via membrane receptors.
- **Steroid hormones:** cortisol, testosterone, estrogen, progesterone — lipid-soluble, act via intracellular receptors.

- **Iodothyronines (amino-acid derived):** thyroid hormones (T_3 , T_4).
 - **Amino-acid derivatives:** epinephrine, norepinephrine.
-

2. The Human Endocrine System — Overview

The endocrine glands and hormone-producing diffused tissues together make up the **endocrine system**. The main organised glands are the **hypothalamus, pituitary, pineal, thyroid, parathyroid, thymus, adrenal, pancreas**, and the **gonads (testis and ovary)**.

[DIAGRAM: Human body outline showing location of pineal and pituitary in the brain, thyroid and parathyroid in the neck, thymus and heart in the chest, adrenals atop the kidneys, pancreas in the abdomen, and gonads in the pelvic region.]

3. Hypothalamus — the Master Controller

The **hypothalamus** is the basal part of the diencephalon (forebrain). It controls the pituitary and, through it, much of the endocrine system.

- Produces **releasing hormones** (e.g., GnRH — stimulate pituitary) and **inhibiting hormones** (e.g., somatostatin — inhibit pituitary).
 - These travel through a portal circulatory system to the anterior pituitary.
 - It also produces **oxytocin** and **vasopressin (ADH)**, which are stored and released by the posterior pituitary.
-

4. Pituitary Gland

The **pituitary gland (hypophysis)** sits in the bony cavity called the **sella turcica** and is attached to the hypothalamus. It has two lobes: **adenohypophysis (anterior)** and **neurohypophysis (posterior)**.

Anterior Pituitary Hormones

Hormone	Main Action
GH (Growth Hormone)	Promotes body growth; excess → gigantism/acromegaly, deficiency → dwarfism
PRL (Prolactin)	Mammary gland growth and milk formation
TSH (Thyroid Stimulating Hormone)	Stimulates thyroid to secrete thyroid hormones
ACTH (Adrenocorticotrophic Hormone)	Stimulates adrenal cortex to secrete glucocorticoids
LH and FSH (Gonadotropins)	Regulate gonadal activity — gametogenesis and sex hormones
MSH	Acts on melanocytes; regulates pigmentation

Posterior Pituitary Hormones

- **Oxytocin**: contraction of smooth muscle of the uterus during childbirth and milk ejection.
 - **Vasopressin (ADH)**: promotes water reabsorption in the kidney (distal tubules); deficiency → **diabetes insipidus**.
-

5. Pineal Gland

The **pineal gland** is located on the dorsal forebrain. It secretes **melatonin**, which regulates the **diurnal (24-hour) rhythm** of the body — the sleep-wake cycle, body temperature, and pigmentation. It also influences the menstrual cycle and defence capability.

6. Thyroid Gland

The **thyroid** is a bilobed gland in the neck. Its follicles secrete **thyroxine (T₄)** and **triiodothyronine (T₃)**, both of which need **iodine** for synthesis.

- Regulate **basal metabolic rate (BMR)**, and control carbohydrate, protein and fat metabolism.
- Support red blood cell formation and maintenance of water and electrolyte balance.
- The thyroid also secretes **thyrocalcitonin (TCT/calcitonin)**, which lowers blood calcium.

Thyroid Disorders

- **Hypothyroidism due to iodine deficiency** → **goitre** (enlarged thyroid).
 - Hypothyroidism in a pregnant mother can cause **cretinism** in the baby (stunted growth, mental retardation, deaf-mutism).
 - **Hyperthyroidism** (e.g., due to thyroid cancer/nodules) raises BMR and disturbs the body.
-

7. Parathyroid Gland

Four **parathyroid glands** are embedded on the back of the thyroid. They secrete **parathyroid hormone (PTH)**, a peptide hormone.

- PTH **increases blood calcium** — it is a hypercalcemic hormone.
 - It stimulates bone resorption (dissolution/demineralisation) and Ca²⁺ reabsorption by kidney tubules, and activates vitamin D for Ca²⁺ absorption from food.
 - PTH and calcitonin act **antagonistically** to maintain calcium balance.
-

8. Thymus

The **thymus** lies between the lungs behind the sternum. It secretes **thymosins**, which:

- Promote differentiation of **T-lymphocytes** for cell-mediated immunity.

- Stimulate production of antibodies for humoral immunity.

The thymus **degenerates with age** (old people have weaker immunity partly because of this).

9. Adrenal Gland

One **adrenal gland** sits atop each kidney. Each has two distinct parts: the outer **adrenal cortex** and the inner **adrenal medulla**.

Adrenal Medulla

Secretes **adrenaline (epinephrine)** and **noradrenaline (norepinephrine)** — collectively **catecholamines**. These are the **emergency / fight-or-flight hormones**: they increase heart rate, BP, alertness, breathing rate, and blood glucose.

Adrenal Cortex

- **Glucocorticoids (e.g., cortisol)**: stimulate gluconeogenesis, protein breakdown and fat breakdown; cortisol is also anti-inflammatory and supports cardiovascular function.
 - **Mineralocorticoids (e.g., aldosterone)**: regulate water and electrolyte balance — reabsorb Na^+ and water, excrete K^+ in kidneys.
 - Small amounts of **androgenic steroids** are also secreted.
-

10. Pancreas — the Dual Gland

The **pancreas** is both exocrine (digestive enzymes) and endocrine. Its endocrine part, the **Islets of Langerhans**, contains two main cell types.

Cell	Hormone	Action
α -cells	Glucagon	Hyperglycemic — raises blood glucose (glycogenolysis, gluconeogenesis)
β -cells	Insulin	Hypoglycemic — lowers blood glucose (glucose uptake, glycogenesis)

Diabetes mellitus: prolonged insulin deficiency (or resistance) causes high blood glucose, loss of glucose in urine, and formation of harmful ketone bodies.

11. Testis and Ovary (Gonads)

- **Testis**: the **Leydig cells (interstitial cells)** secrete **androgens**, mainly **testosterone**. These control male accessory sex organs, spermatogenesis, and secondary sexual characters, and influence male sexual behaviour.
 - **Ovary**: secretes **estrogen** (female secondary sexual characters, follicle growth) and **progesterone** (maintains pregnancy, mammary gland development, supports gestation).
-

12. Hormones of the Heart, Kidney and GI Tract

Several organs that are not classic endocrine glands also secrete hormones.

- **Heart:** the atrial wall secretes **Atrial Natriuretic Factor (ANF)**, which **decreases blood pressure** by causing dilation of blood vessels.
- **Kidney:** the juxtaglomerular cells secrete **erythropoietin**, which stimulates RBC formation (erythropoiesis); the kidney also produces **renin**.
- **Gastrointestinal tract:** secretes **gastrin** (HCl and pepsinogen secretion), **secretin** (pancreatic water and bicarbonate), **cholecystokinin/CCK** (pancreatic enzymes and bile release), and **gastric inhibitory peptide/GIP** (inhibits gastric secretion and motility).

13. Mechanism of Hormone Action

A hormone acts only on a **target cell** that carries a specific **receptor**. Receptors located on the cell membrane are **membrane-bound receptors**; those inside the cell are **intracellular receptors**.

Protein/Peptide Hormones (membrane receptors)

Being water-soluble, they cannot enter the cell. They bind to a membrane receptor and generate **second messengers** (such as **cyclic AMP**, **IP₃**, **Ca²⁺**), which trigger the cellular response. The hormone itself is the “first messenger”.

Steroid & Thyroid Hormones (intracellular receptors)

Being lipid-soluble, they diffuse through the membrane, bind to intracellular receptors, and the hormone-receptor complex **interacts with the genome**, regulating gene expression and producing the response.

Weightage in Board & Entrance Exams

Exam	Typical Weightage	Most-Tested Areas
CBSE Board (Class 11)	5–7 marks	Endocrine glands & their hormones, disorders, mechanism of hormone action
NEET	2–3 questions	Hormone-gland-action matching, disorders, second messengers, non-endocrine hormones
Other entrance (CUET/state)	1–2 questions	Pituitary hormones, insulin/glucagon, ANF/erythropoietin

[TABLE: Question-type split — VSA (1 mark): gland-hormone-action facts; SA (2–3 marks): disorders, hypothalamic control, mechanism; LA (5 marks): full endocrine system / adrenal & pancreatic hormones.]

Important Definitions

Term	Definition
Hormone	A non-nutrient chemical messenger, secreted in trace amounts, that acts on a target cell carrying its receptor
Endocrine gland	A ductless gland that secretes hormones directly into the blood
Target cell	A cell bearing the specific receptor for a given hormone
Second messenger	An intracellular molecule (e.g., cyclic AMP) that relays the signal of a peptide hormone
Goitre	Enlargement of the thyroid gland, commonly due to dietary iodine deficiency
Diabetes mellitus	Disorder of high blood glucose due to insulin deficiency or resistance
Diabetes insipidus	Excess dilute urine due to deficiency of vasopressin (ADH)
Cretinism	Stunted growth and mental retardation in a child due to hypothyroidism
ANF	Atrial Natriuretic Factor — heart hormone that lowers blood pressure
Erythropoietin	Kidney hormone that stimulates red blood cell formation

Solved Examples & Fact Drills

Example 1

A person's diet lacks iodine for a long time. Which gland enlarges and what is the condition called?

Answer: The **thyroid gland** enlarges because it cannot make enough T_3/T_4 ; the condition is **goitre** (simple/endemic goitre).

Example 2

Name the cells of the Islets of Langerhans and the hormone each secretes.

Answer: **α -cells** → **glucagon** (raises blood glucose); **β -cells** → **insulin** (lowers blood glucose).

Example 3

Which hormone is called the "emergency hormone" and from where is it secreted?

Answer: **Adrenaline (epinephrine)**, secreted by the **adrenal medulla**; it prepares the body for "fight or flight".

Example 4

A patient passes a large volume of dilute urine and is always thirsty, but blood glucose is normal. Identify the disorder and the hormone involved.

Answer: Diabetes insipidus, caused by deficiency of **vasopressin (ADH)**, so the kidney fails to reabsorb water.

Example 5

Steroid hormones and protein hormones differ in how they act on a target cell. State the key difference.

Answer: Steroid hormones are lipid-soluble, enter the cell, and the hormone-receptor complex acts on the **genome**. **Protein hormones** bind **membrane receptors** and act through **second messengers** like cyclic AMP.

Example 6

Match the hormone to its source organ: ANF, erythropoietin, gastrin.

Answer: ANF → heart (atrial wall); erythropoietin → kidney; gastrin → stomach/GI tract.

Important Questions for Board Exams

1-Mark Questions (VSA)

1. Name the hormone secreted by the pineal gland and one function of it.
2. Which gland is called the “master gland” and why is the term not fully accurate?
3. Name the cells of the testis that secrete testosterone.
4. What is the role of thyrocalcitonin (TCT)?
5. Which hormone of the heart lowers blood pressure?

2–3-Mark Questions (SA)

1. Differentiate between endocrine and exocrine glands with one example each.
2. Explain how parathyroid hormone and calcitonin act antagonistically to regulate blood calcium.
3. Describe the role of the hypothalamus in controlling the anterior pituitary.
4. List any three hormones secreted by the gastrointestinal tract and one action of each.

5-Mark Questions (LA)

1. Describe the structure of the adrenal gland and the hormones secreted by its cortex and medulla, with their functions.
2. Explain the mechanism of hormone action for protein hormones and for steroid hormones.

3. Give an account of the hormones of the pancreas and explain how blood glucose is regulated; name the disorder of insulin deficiency.
-

Quick Revision Points

- Endocrine glands are ductless; hormones travel via blood to target cells with receptors
 - Hypothalamus controls pituitary via releasing/inhibiting hormones; makes oxytocin & ADH
 - Anterior pituitary: GH, PRL, TSH, ACTH, LH, FSH, MSH; posterior: oxytocin, vasopressin (ADH)
 - Pineal → melatonin (diurnal rhythm); thymus → thymosins (T-cell maturation)
 - Thyroid: T_3 , T_4 (need iodine, control BMR) + calcitonin (lowers Ca^{2+}); deficiency → goitre/cretinism
 - Parathyroid → PTH raises blood Ca^{2+} (antagonist of calcitonin)
 - Adrenal medulla → adrenaline/noradrenaline (fight-or-flight); cortex → glucocorticoids, mineralocorticoids
 - Pancreas: α -cells → glucagon (raises glucose), β -cells → insulin (lowers glucose); deficiency → diabetes mellitus
 - Testis → testosterone (Leydig cells); ovary → estrogen & progesterone
 - Heart → ANF (lowers BP); kidney → erythropoietin; GI tract → gastrin, secretin, CCK, GIP
 - Peptide hormones → membrane receptor + second messenger (cAMP); steroids/thyroid → intracellular receptor + genome
-

Next Chapter: Chapter 18 — Body Fluids and Circulation (Unit 5 companion)



Got this PDF from a friend?

Everything here is free at **chapternotes.in** — 134 chapters of notes, a gamified practice app, and full NEET mock & prediction papers.



Scan to practice this chapter free in the app