FREE NOTES · NCERT + NEET LEVEL

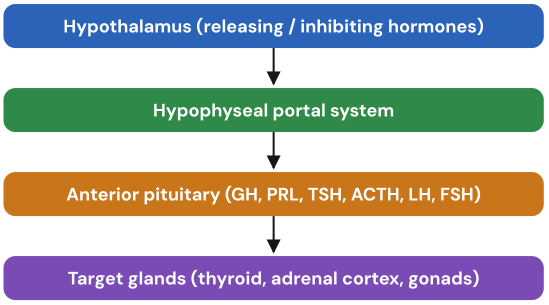
Chemical Coordination & Integration

Endocrine glands aur hormones: hypothalamus, pituitary, pineal, thyroid, parathyroid, thymus, adrenal, pancreas, gonads, heart, kidney aur GI tract ke hormones, aur hormone action ka mechanism.

01 Endocrine system aur hypothalamus
02 Pituitary aur pineal
03 Thyroid, parathyroid, thymus
04 Adrenal aur pancreas
05 Gonads aur doosre hormones
06 Hormone action ka mechanism
07 Extra + tricks
08 Important Q&A
09 Common mistakes
10 Practice (NEET style)
11 Quick revision

01 Endocrine system aur hypothalamus

- Endocrine glands bina duct ke; secretions = **hormones**: non-nutrient chemicals, intercellular messengers, bahut kam matra me.
- Hypothalamus: diencephalon ka neeche ka hissa; neurosecretory cells **releasing** hormones (jaise GnRH pituitary gonadotrophins badhata) aur **inhibiting** hormones (jaise somatostatin GH rokta) banate.
- Ye portal circulation se anterior pituitary tak; posterior pituitary seedhe hypothalamus ki nerves se control.



Hypothalamus–pituitary axis

02 Pituitary aur pineal

Part	Hormone	Action / disorder
Adenohypophysis (pars distalis)	GH	Growth; excess in child: **gigantism**; low: **pituitary dwarfism**; excess in adult: **acromegaly**
	Prolactin	Mammary gland growth, milk formation
	TSH, ACTH	Thyroid hormones; glucocorticoids from adrenal cortex
	LH, FSH (gonadotrophins)	Males: LH → androgens from testis, FSH + androgens → spermatogenesis. Females: LH → ovulation, corpus luteum; FSH → follicle growth
Pars intermedia	MSH	Melanocytes, skin pigmentation (almost merged with pars distalis in humans)
Neurohypophysis (stores, released from hypothalamus)	Oxytocin	Smooth muscle contraction: uterus at childbirth, milk ejection
	Vasopressin (ADH)	Water reabsorption in DCT; deficiency: **diabetes insipidus**
Pineal (dorsal forebrain)	Melatonin	24-h (diurnal) rhythm: sleep-wake, body temperature; also pigmentation, menstrual cycle, defence

03 Thyroid, parathyroid, thymus

- **Thyroid**: do lobes isthmus se jude; follicles **T_4 (thyroxine)** aur **T_3** banate; iodine chahiye. Iodine ki kami ⇒ hypothyroidism aur bada gland: **goitre**. Pregnancy me hypothyroidism ⇒ bachche me **cretinism** (ruki growth, mansik kamzori, bahara-goonga). Adult hypothyroidism: aniyamit menstrual cycle. **Hyperthyroidism** aur **exophthalmic goitre** (Graves' disease: bada thyroid, bahar nikli aankhen, zyada BMR, wazan kam).
- T_3/T_4: BMR, RBC banna, metabolism, paani aur electrolyte balance. **Thyrocalcitonin (TCT)**: blood Ca^{2+} ghatata.
- **Parathyroid** (4, thyroid ke peeche): **PTH** blood Ca^{2+} badhata: haddi se Ca^{2+} nikalna, kidney me wapas lena, khane se sokhna. PTH aur TCT milke Ca^{2+} control.
- **Thymus** (lungs ke beech, sternum ke peeche): **thymosins** T-lymphocytes ke differentiation (cell-mediated immunity) aur antibodies (humoral immunity) me madad. Budhape me chhota ⇒ kamzor immunity.

04 Adrenal aur pancreas

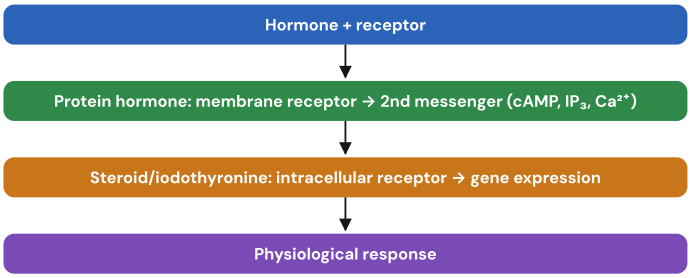
Gland	Hormone	Kaam
Adrenal medulla	Adrenaline, noradrenaline (catecholamines): "emergency" / fight-or-flight	Saavdhaani, pupil phailna, rongte khade, paseena, dhadkan aur saans tez, glycogenolysis, lipolysis, proteolysis
Adrenal cortex (zona reticularis, fasciculata, glomerulosa)	Glucocorticoids (cortisol)	Gluconeogenesis, lipolysis, proteolysis; sujan kam; immune response dabata; RBC banna; heart aur kidney ke kaam
	Mineralocorticoids (aldosterone)	Na^+ aur paani wapas, K^+ aur phosphate bahar: electrolytes, BP
	Androgenic steroids	Puberty me baghal, pubic, chehre ke baal
Pancreas (islets of Langerhans; 10–20 lakh)	Glucagon (α-cells)	Hyperglycaemic: liver me glycogenolysis, gluconeogenesis
	Insulin (β-cells)	Hypoglycaemic: liver aur fat cells glucose lete, glycogenesis. Lagatar zyada sugar ⇒ **diabetes mellitus** (urine me glucose, ketone bodies)

Adrenal cortex hormones ki kami ⇒ **Addison's disease**.

05 Gonads aur doosre hormones

- **Testis**: Leydig (interstitial) cells **androgens** (mainly testosterone): male accessory organs, secondary sexual characters (muscles, daadhi, bhaari awaaz), spermatogenesis, male sexual behaviour, protein aur carbohydrate metabolism pe anabolic asar.
- **Ovary**: **oestrogen** (badhte follicles: female secondary sex organs, mammary glands, female sexual behaviour) aur **progesterone** (corpus luteum: pregnancy sambhalna, doodh ki alveoli).
- Heart atria: **ANF** BP kam. Kidney JG cells: **erythropoietin** RBC banna.
- GI tract: **gastrin** (HCl, pepsinogen), **secretin** (pancreas se paani, bicarbonate), **CCK** (pancreatic enzymes, bile), **GIP** (gastric secretion aur motility rokta). Non-endocrine tissues ke growth factors repair me madad.

06 Hormone action ka mechanism



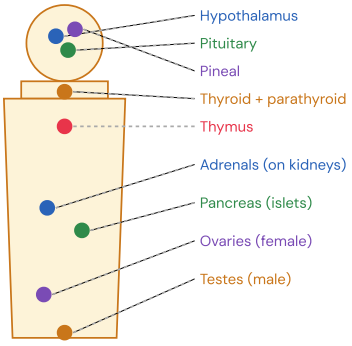
Hormones target cells pe kaise kaam karte

Chemical nature	Examples	Receptor
Peptide, polypeptide, protein	Insulin, glucagon, pituitary aur hypothalamic hormones	Membrane pe; second messenger
Steroids	Cortisol, testosterone, oestradiol, progesterone	Cell ke andar (nucleus)
Iodothyronines	Thyroid hormones	Cell ke andar
Amino-acid derivatives	Adrenaline, noradrenaline	Membrane pe

07 Extra + tricks

Disorder	Kaaran
Myxoedema	Adults me hypothyroidism (phoola chehra, kam BMR)
Hashimoto's disease	Autoimmune: thyroid ka naash
Conn's syndrome	Zyada aldosterone (high BP, kam K^+)
Cushing's syndrome	Zyada cortisol (gol chehra, zyada sugar, pet pe motapa)
Adrenal virilism	Mahilaon me zyada adrenal androgens (chehre pe baal)
Tetany	Kam PTH ⇒ blood Ca^{2+} kam

- Islets of Langerhans: α (glucagon), β (insulin), **δ (somatostatin**: dono ko rokta), PP cells (pancreatic polypeptide).
- Thyroid = sabse badi endocrine gland; pituitary = "master gland" par hypothalamus ke control me.



Mukhya endocrine glands ki jagah

08 Important Q&A

Q1. Diabetes mellitus aur insipidus me antar?

Mellitus: insulin ki kami, zyada blood glucose, urine me glucose. Insipidus: ADH ki kami, zyada patla urine, pyaas.

Q2. Adrenaline ko emergency hormone kyun kehte?

Khatre/stress me jaldi nikalta aur body ko fight-or-flight ke liye taiyaar karta.

Q3. PTH aur TCT saath kaise kaam karte?

PTH Ca^{2+} badhata, TCT ghatata; milke Ca^{2+} balance.

09 Common mistakes

- Kehna ki posterior pituitary oxytocin banata (sirf store; hypothalamus banata).
- Gigantism (bachcha) aur acromegaly (adult) mix karna.
- Insulin ko α-cells se likhna (β-cells).
- Kehna ki steroid hormones cAMP use karte.

10 Practice (NEET style)

1. Diabetes insipidus me kis hormone ki kami?
2. Diurnal rhythm ka hormone?
3. Adrenal cortex ki kami ki bimari?
4. RBC banane wala hormone?
5. Exophthalmic goitre ka doosra naam?

ANSWERS

1) ADH (vasopressin) · 2) Melatonin · 3) Addison's disease · 4) Erythropoietin · 5) Graves' disease

11 Quick revision: exam se 5 minute pehle

PITUITARY

- GH: gigantism / acromegaly
- LH, FSH, TSH, ACTH, PRL
- Posterior: oxytocin, ADH

THYROID GROUP

- T_3, T_4 ko iodine
- Cretinism, goitre, Graves
- PTH Ca^{2+} upar, TCT neeche

ADRENAL/PANCREAS

- Adrenaline: fight/flight
- Cortisol, aldosterone
- Insulin β, glucagon α

MECHANISM

- Protein: membrane, cAMP
- Steroid: nuclear receptor

Koi doubt? padhaiadda.netlify.app pe AI Doubt Solver se poocho, ya is chapter ka mock test do.