FLASH CARDS

CLASS : Class 11th **SUBJECT : Zoology**

CHAPTER: Chemical Coordination and Integration

Terminology	Description
Chemical Coordination	Regulation of body functions through hormones.
Endocrine Glands	Ductless glands that secrete hormones into the blood.
Hormones	Hormones are non-nutrient chemicals that act as intercellular messengers and are produced in trace amounts.
Target Organ	The organ on which the hormone acts.
Human Endocrine System	The endocrine glands and hormone producing diffused tissues/cells located in different parts of our body constitute the endocrine system. Pituitary, pineal, thyroid, adrenal, pancreas, parathyroid, thymus, and gonads (testis in males and ovary in females) are the organised endocrine bodies in our body
Hypothalamus	The hypothalamus connects the nervous system to the endocrine system. Its neurosecretory cells produce releasing hormones, which stimulate the pituitary gland, and inhibiting hormones, which suppress pituitary hormone secretion.
Pituitary Gland (Master Gland)	The master gland regulates other endocrine glands. Secretes GH, TSH, ACTH, FSH, LH, Prolactin. Posterior Pituitary releases ADH & Oxytocin.
Growth Hormone	Stimulates the growth of bones & tissues. Over-secretion of GH stimulates abnormal growth of the body leading to gigantism, and low secretion of GH results in stunted growth, resulting in pituitary dwarfism.
Prolactin	Prolactin regulates the growth of the mammary glands and the formation of milk in them.
Thyroid stimulating hormone (TSH)	TSH stimulates the synthesis and secretion of thyroid hormones from the thyroid gland.
Adrenocorticotropic hormone (ACTH)	ACTH stimulates the synthesis and secretion of steroid hormones called glucocorticoids from the adrenal cortex.
Luteinizing hormone (LH)	LH stimulates the synthesis and secretion of hormones called androgens from the testis.

	In females, LH induces ovulation of fully mature follicles (Graafian follicles) and maintains the corpus luteum, formed from the remnants of the Graafian follicles after ovulation.
Follicle-stimulating hormone (FSH)	In males, FSH and androgens regulate spermatogenesis. FSH stimulates growth and development of the ovarian follicles in females.
Oxytocin	Oxytocin acts on the smooth muscles of our body and stimulates their contraction. In females, it stimulates a vigorous contraction of uterus at the time of child birth, and milk ejection from the mammary gland.
Vasopressin	Vasopressin acts mainly at the kidney and stimulates resorption of water and electrolytes by the distal tubules and thereby reduces loss of water through urine (diuresis). Hence, it is also called as anti-diuretic hormone (ADH).
The pineal gland	The pineal gland, located on the dorsal side of the forebrain, secretes melatonin, which regulates the body's 24-hour (diurnal) rhythm. Melatonin controls the sleep–wake cycle and body temperature, and also influences metabolism, pigmentation, the menstrual cycle, and immunity.
Thyroid Gland	The thyroid gland is composed of follicles and stromal tissues. Each thyroid follicle is composed of follicular cells, enclosing a cavity. These follicular cells synthesise two hormones, tetraiodothyronine or thyroxine (T4) and triiodothyronine (T3).
Hypothyroidism	Iodine is essential for the normal rate of hormone synthesis in the thyroid. Deficiency of iodine in our diet results in hypothyroidism and enlargement of the thyroid gland, commonly called goitre. Hypothyroidism during pregnancy causes defective development and maturation of the growing baby leading to stunted growth (cretinism), mental retardation, low intelligence quotient, abnormal skin, deaf-mutism, etc.
Hyperthyroidism	Due to cancer of the thyroid gland or due to development of nodules of the thyroid glands, the rate of synthesis and secretion of the thyroid hormones is increased to abnormal high levels leading to a condition called hyperthyroidism which adversely affects the body physiology.
Functions of Thyroid Hormones	Thyroid hormones regulate the basal metabolic rate and control the metabolism of carbohydrates, proteins, and fats. They also support red blood cell formation and help maintain water and electrolyte balance. The thyroid gland also secretes thyrocalcitonin (TCT), which regulates blood calcium levels.
Parathyroid Gland	Humans have four parathyroid glands located on the back of the thyroid gland. They secrete parathyroid hormone (PTH), which is regulated by blood calcium levels. PTH increases blood Ca^{2+} by stimulating bone resorption, enhancing calcium reabsorption in the kidneys, and increasing absorption from food. It is a hypercalcemic hormone and works with thyrocalcitonin (TCT) to maintain calcium balance.

Thymus	The thymus gland, located above the heart and aorta, plays a key role in immune system development. It secretes thymosins, which help in the maturation of T lymphocytes for cell-mediated immunity and also support antibody production for humoral immunity.
Adrenal Gland	The gland is composed of two types of tissues. The centrally located tissue is called the adrenal medulla, and outside this lies the adrenal cortex
Adrenal medulla	The adrenal medulla secretes two hormones called adrenaline or epinephrine and noradrenaline or norepinephrine. These are commonly called as catecholamines.
Emergency hormones	Adrenaline and noradrenaline are rapidly secreted in response to stress of any kind and during emergency situations and are called emergency hormones or hormones of Fight or Flight. These hormones increase alertness, pupilary dilation, piloerection (raising of hairs), sweating etc. Both the hormones increase the heart beat, the strength of heart contraction and the rate of respiration.
Adrenal Cortex	The adrenal cortex can be divided into three layers, called zona reticularis (inner layer), zona fasciculata (middle layer) and zona glomerulosa (outer layer). The adrenal cortex secretes many hormones, commonly called as corticoids.
Gucocorticoids	The corticoids, which are involved in carbohydrate metabolism, are called glucocorticoids. In our body, cortisol is the main glucocorticoid.
Glucocorticoids - Functions	Glucocorticoids stimulate, gluconeogenesis, lipolysis and proteolysis; and inhibit cellular uptake and utilisation of amino acids. Cortisol is also involved in maintaining the cardio-vascular system as well as the kidney functions.
Cortisol	Glucocorticoids, particularly cortisol, produces anti inflamatory reactions and suppresses the immune response. Cortisol stimulates the RBC production.
Mineralocorticoid	Corticoids, which regulate the balance of water and electrolytes in our body, are called mineralocorticoids. Aldosterone is the main mineralocorticoid in our body.
Aldosterone	Aldosterone acts mainly at the renal tubules and stimulates the reabsorption of Na^+ and water and excretion of K^+ and phosphate ions. Thus, aldosterone helps in the maintenance of electrolytes, body fluid volume, osmotic pressure and blood pressure.
Pancreas	The pancreas is a composite gland that acts as both an exocrine and an endocrine gland. The endocrine pancreas consists of 'Islets of Langerhans'. The two main types of cells in the Islet of Langerhans are called α-cells and β-cells. The α-cells secrete a hormone called glucagon, while the β-cells secrete insulin.
Glucagon	Glucagon is a peptide hormone that helps maintain normal blood glucose levels. It acts mainly on liver cells (hepatocytes) and stimulates glycogenolysis, increasing blood sugar levels (hyperglycemia).

Insulin	Insulin is a peptide hormone that regulates blood glucose levels. It acts on liver cells (hepatocytes) and fat cells (adipocytes) to increase glucose uptake and utilization. This causes glucose to move from the blood into cells, lowering blood glucose levels (hypoglycemia).
Diabetes mellitus	Prolonged hyperglycemia leads to a complex disorder called diabetes mellitus which is associated with loss of glucose through urine and formation of harmful compounds known as ketone bodies.
Testis	A pair of testes is located in the scrotal sac outside the abdomen. They function both as primary sex organs and as endocrine glands. The testes contain seminiferous tubules and interstitial (stromal) tissue. The Leydig (interstitial) cells produce androgens, mainly testosterone.
Androgens	Androgens regulate the development and function of male accessory sex organs such as the epididymis, vas deferens, seminal vesicles, prostate gland, and urethra. They promote muscle growth, facial and body hair growth, deepening of voice, and male sexual behavior (libido), and stimulate spermatogenesis. Androgens also have anabolic effects on protein and carbohydrate metabolism.
Ovary	Females have a pair of ovaries in the abdomen that function as the primary sex organs and release one ovum during each menstrual cycle. The ovaries also secrete the steroid hormones estrogen (from growing ovarian follicles) and progesterone (mainly from the corpus luteum formed after ovulation).
Estrogens	Estrogens stimulate the growth and activity of female secondary sex organs and support the development of ovarian follicles. They promote female secondary sexual characteristics (such as a higher-pitched voice), aid in mammary gland development, and regulate female sexual behavior.
Progesterone	Progesterone supports pregnancy. Progesterone also acts on the mammary glands and stimulates the formation of alveoli (sac-like structures which store milk) and milk secretion.
Atrial natriuretic factor (ANF)	The atrial walls of the heart secrete atrial natriuretic factor (ANF), a peptide hormone that lowers blood pressure. When blood pressure rises, ANF is released, causing dilation of blood vessels and thereby reducing blood pressure.
Erythropoietin	The juxtaglomerular cells of the kidney produce a peptide hormone called erythropoietin, which stimulates erythropoiesis (formation of RBC).
Gastrin	Gastrin acts on the gastric glands and stimulates the secretion of hydrochloric acid and pepsinogen.

Secretin	Secretin acts on the exocrine pancreas and stimulates the secretion of water and bicarbonate ions.
Cholecystokinin (CCK)	CCK acts on both the pancreas and gall bladder and stimulates the secretion of pancreatic enzymes and bile juice, respectively.
Gastric inhibitory peptide (GIP)	GIP inhibits gastric secretion and motility.
Mechanism of Hormone Action	Hormones act by binding to specific receptors on or inside target cells. This hormone–receptor interaction triggers changes in cellular activity. **Protein (peptide) hormones** bind to receptors on the cell membrane and act through secondary messengers. **Steroid hormones** pass through the cell membrane and bind to intracellular receptors, directly influencing gene expression.
Peptide/Protein Hormones	Made of amino acids. *Examples:* Insulin, Glucagon, Growth hormone.
Steroid Hormones	Derived from cholesterol and lipid-soluble. *Examples:* Testosterone, Estrogen, Progesterone, Cortisol.
Amino Acid Derivative Hormones	Derived from single amino acids (like tyrosine). *Examples:* Thyroxine, Adrenaline, Noradrenaline.
Iodothyronines	Iodothyronines are iodine-containing hormones produced by the thyroid gland. The two main iodothyronines are: Thyroxine (T_4) Triiodothyronine (T_3) They regulate basal metabolic rate, growth, development, and metabolism of carbohydrates, proteins, and fats.



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