

CHEMICAL COORDINATION AND INTEGRATION

- Hormones are non-nutrient chemicals which act as intercellular messengers and are produced in trace amount.

Pituitary Gland is located in a body cavity called sella turcica and is attached to the hypothalamus by a stalk.

- * The pituitary gland (hypophysis) is composed of the adenohypophysis (anterior lobe) and the neurohypophysis (posterior lobe).
- In Anterior lobe, the pars distalis secretes Growth Hormone (GH), Thyroid Stimulating Hormone (TSH), Adrenocorticotrophic hormone (ACTH), Follicle-stimulating hormone (FSH), Luteinizing hormone (LH), and Prolactin. The pars intermedia secretes Melanocyte-stimulating hormone (MSH).

* The posterior pituitary stores and secretes (but does not synthesize) the following important endocrine hormones vasopressin and oxytocin.

Over secretion of GH (growth hormone) causes overgrowth of the body leading to gigantism and low secretion causes stunted growth called dwarfism.
 Prolactin stimulates growth of mammary gland secretion, of milk. PSH stimulates and regulates thyroid hormone.

FSH stimulates gonadal activity. In male, LH stimulates synthesis and secretion of androgen hormone from testis. In female, LH it stimulates ovulation of fully mature ovum from ovary.
 Oxytocin helps in contraction of uterus during child birth and milk ejection from mammary glands.
 Vasopressin stimulates absorption of water and electrolyte in kidney.

The pineal Gland is located on dorsal side of forebrain and release melatonin hormone that helps in 24 hour rhythm of body like sleep wake cycle and body temperature.

Thyroid Gland- composed of two lobes on either side of trachea connected by isthmus.

- The 2 main thyroid hormones are T3 (triiodothyronine) and T4 [thyroxine].
- Iodine is essential for synthesis of thyroid hormones. Deficiency of iodine leads to hyperthyroidism (Goitre). During pregnancy, hyperthyroidism may cause stunted growth of baby and mental retardation.

Parathyroid Gland- located on the back side of thyroid gland, secretes peptide hormone called parathyroid hormone. PTH regulates the circulating level of calcium ions. It also helps in reabsorption of calcium from renal tubules and digestive tracts.

Thymus - located on the dorsal side of heart and the aorta. This gland releases peptide hormone thymosins that help in differentiation of T-Lymphocytes. It also promotes production of antibodies to provide humeral immunity.

Adrenal Gland — located on anterior part of each kidney, composed of two types of tissues central adrenal medulla and outside adrenal cortex. Adrenal medulla secretes adrenaline and noradrenaline hormone together called emergency hormone. Adrenal cortex secretes many hormones together called corticoids which are involved in metabolism of carbohydrates and maintaining water and electrolyte balance.

Pancreas — acts as both endocrine and exocrine gland. Endocrine pancreas consists of 'Islets of Langerhans' which contain α -cells and β -cells. The α -cells secrete hormone glucagon and β -cells secrete insulin. Both hormones are involved in maintenance of blood sugar levels.

- Glucagon is a peptide hormone that stimulates glycogenolysis resulting increased blood sugar (hyperglycemia).
- Insulin is a peptide hormone that plays major role in regulation of glucose homeostasis. The rapid movement of glucose from blood to hepatocytes and adipocytes resulting in decreased blood glucose levels (hypoglycemia).

Testis — perform dual functions as a primary sex organ as well as endocrine gland's. Leydig cells or interstitial cells produce androgen mainly testosterone which regulates regulation and maturation of primary sex organs.

Ovary — produce two groups of steroid hormones called estrogen and progesterone. Estrogen is synthesized and secreted by growing ovarian follicles. After ovulation, ruptured ovum called corpus luteum, which secretes progesterone. Estrogen produces wide range actions like growth of female secondary sex organs. Progesterone regulates pregnancy.

Atrial wall of heart secretes peptide hormone called atrial natriuretic factor (ANF) that causes blood dilution. The Juxtaglomerular cells of kidney produce erythropoietin hormone which stimulates erythropoiesis.