

The Endocrine System

Hormones

The endocrine system is responsible for the delivery of chemical messengers or hormones. These messengers are secreted directly into the blood (thus *endo-crine*) especially by a gland, without passing through a duct in order to enter the blood.

Hormones are grouped together by their *function*, not by their structure. Some are made of protein, such as insulin, while others are steroids (adreno-corticoid hormones), glycoproteins (FSH, LH, TSH) and derivatives of single amino-acids (T4, T3). All hormones, however, are produced in a gland and then transported to an area or organ they control.

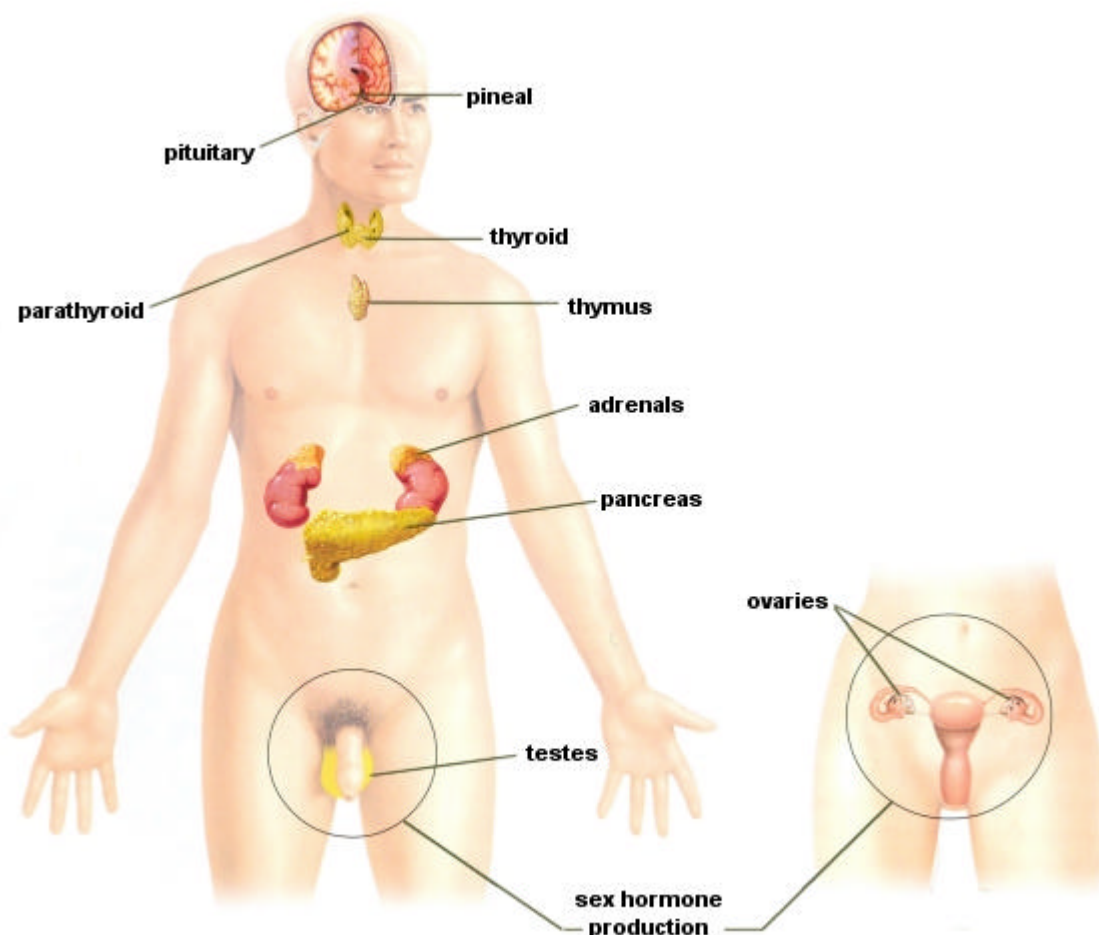


Fig. 1 Location of hormone production

Hormones play an important role in homeostasis and are also responsible for the development and growth of the human body. In addition to this, the sex hormones control aspects of reproduction, i.e. the menstrual cycle in women.

The following describes which hormones each gland is responsible for producing, its function and control:

	Hormone		Function	Control
Hypothalamus		Releasing and inhibiting hormones	Control of anterior pituitary	Hormone and metabolite feedback
Posterior Pituitary		Oxytocin	Ejection of milk Uterine contraction (birth)	Hormone and nerve feedback
	ADH	Anti-diuretic Hormone (aka vasopressin)	Reduces urine volume	Blood concentration (osmosis)
Anterior Pituitary	FSH	Follicle Stimulating Hormone	Spermatogenesis (males) Follicular development (females)	Plasma oestrogen and progesterone levels
	LH (females)	Luteinising Hormone	Ovulation and maintenance of corpus luteum (females)	Plasma oestrogen
	ICSH (males)	Interstitial Cell Stimulating Hormone	Testosterone secretion (males)	Plasma testosterone
		Prolactin	Stimulates milk production	Hypothalamic hormones
	TSH	Thyrotrophin	Synthesis and release of thyroid hormones	Plasma thyroxine levels
	ACTH	Adrenal Cortex Hormone	Synthesis and release of adrenal cortex hormones	Plasma ACTH
	HGH	Human Growth Hormone	Protein synthesis, growth (bones)	Hypothalamic hormones

	Hormone		Function	Control
	MSH	Melanocyte Stimulating Hormone	Melanin synthesis and secretion	Sympathetic Nervous System
Parathyroid		Parathormone	Increases blood Ca Reduces blood PO ₄	Plasma Ca and PO ₄ levels
Thyroid		Thyroxin	Regulation of BMR (base metabolic rate) Growth and development	TSH
		Triiodothyronin	Regulation of BMR Growth and development	TSH
		Calcitonin	Decrease blood Ca	Plasma Ca levels
Thymus		T lymphocytes	Immunity	Plasma proteins
Pineal		Melatonin	Melanin production	Sympathetic Nervous System
		Serotonin	Control circadian rhythms	Sympathetic Nervous System
Adrenal Cortex		Corticosteroids	Metabolism of proteins and carbohydrates in response to stress. Stress Adaptation	ACTH
		Mineralocorticoids (Aldosterone)	Na retention in kidney NA and K levels, raises BP	Plasma Na and K levels Low blood pressure
Adrenal Medulla		Adrenaline	Increased heart rate. Dilation of skeletal arterioles. Increased blood glucose etc.	Sympathetic Nervous System
		Noradrenaline	Constriction of arterioles therefore BP raises	Nervous System

	Hormone	Function	Control
Islets of Langerhans	Insulin (beta cells)	Blood glucose converted to glycogen. Increased cell uptake, i.e. reduces blood glucose	Plasma glucose and amino acid levels
	Glucagon (alpha cells)	Breakdown of glycogen to glucose, i.e. increases blood glucose levels	Plasma glucose levels
Ovarian Follicle	Oestrogen	Secondary sexual characteristics. Oestrous cycle	FSH and LH
	Progesterone	Gestation. Inhibition of ovulation	LH
Testis	Testosterone	Secondary characteristics	FSH and LH (ICSH)