



ELECTROEPILATION

MasterClass Apilus

The endocrine system and the anatomy
of the hair

Module 1



Académie Apilus

Electroepilation, The endocrine system and the anatomy of the hair

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The feminine is used without any discrimination and only with the aim of relieving the text.

THE ENDOCRINE SYSTEM AND THE ANATOMY OF THE HAIR

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THE ENDOCRINE SYSTEM

In conjunction with the nervous system, the endocrine system regulates several activities in the body. It is composed of glands that secrete hormones, chemical substances released into the bloodstream. Derived from the covering epithelium, endocrine glands play a major role in maintaining the body's equilibrium. Unlike the nervous system, which reacts rapidly by transmitting nerve impulses, hormones act more slowly, however their effects are longer-lasting. The endocrine system regulates and co-ordinates:

- Growth and development;
- Reproduction;
- Sexual differentiation;
- Blood compositional balance;
- Regulation and coordination of cellular metabolism;
- Regulation of the body in stressful situations.

Hormones are chemical substances released into the bloodstream that acts as a messenger.

The endocrine glands include:

- The pituitary gland;
- The thyroid gland;
- The parathyroid glands;
- The adrenal glands;
- The pancreas;
- The gonads: ovaries and testes.

Endocrine glands and secreted hormones work together. The body's equilibrium is therefore based on hormonal and nervous activities. Certain glands work in conjunction with others or complement each other, whereas the pituitary gland controls the operation of other glands through the secretion of stimulating hormones.

The endocrine system interacts closely with electrolysis mainly because certain glands disfunction may affect the pilosity & the healing process.

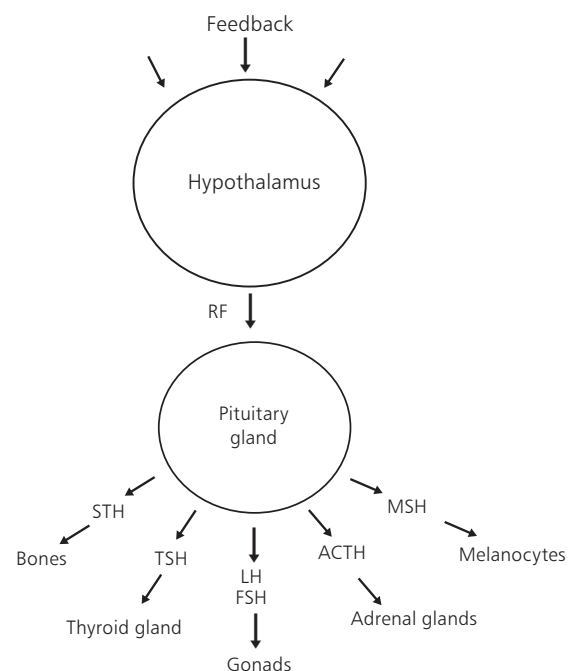
The Hypothalamus

Part of the central nervous system, the hypothalamus is located above the pituitary gland to which is it connected by the pituitary stalk. The hypothalamus directly controls the activity of certain endocrine glands through the pituitary gland. It is called the brain of the endocrine system.

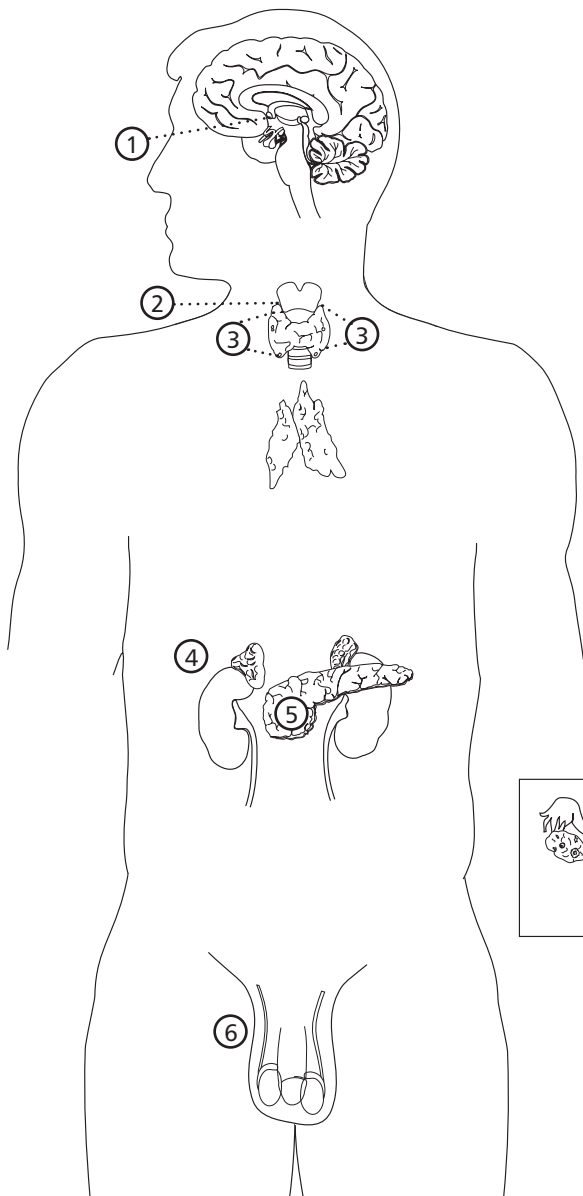
RF and Feedback

Feedback is the message the hypothalamus receives, indicating when certain glands produce too much or not enough hormones. The hypothalamus must then make a decision.

The RF ("Releasing Factor") is the decision the hypothalamus sends by way of a secretion to the pituitary gland that will activate the production of the appropriate stimulins in order to stimulate or inhibit the operation of the targeted organ, as needed.



▲ Figure 2.4 RF and Feedback



- ① Pituitary gland
 - Anterior pituitary
 - Somatotropin (STH)
 - LH (luteinizing)
 - FSH (follicle stimulating)
 - ACTH (corticotropin)
 - TSH (thyroid stimulating)
 - MSH (melanocyte stimulating)
 - Metabolic hormones
 - Posterior pituitary
 - ADH (antidiuretic)
 - Oxytocin
- ② Thyroid gland
 - T2 (minor)
 - T3 (triiodothyronine)
 - T4 (thyroxine, most important)
 - Calcitonin
- ③ Parathyroid glands
 - Parathyroid (PTH)
- ④ Adrenal glands
 - Adrenal cortex
 - Glucocorticoid
 - Mineralocorticoid
 - Oestrogen
 - Testosterone
 - Adrenal medulla
 - Adrenaline
 - Noradrenaline
- ⑤ Pancreas
 - Insulin
 - Glucagon
- ⑥ Gonads
 - Ovaries
 - Oestrogen (folliculine)
 - Progesterone (corpus luteum)
 - Androgen
 - Testes
 - Testosterone (androsterone)
 - Androgen
 - Estrogen

▲ Figure 2.5 Endocrine Glands and Hormones

Calcitonin and parathyroid hormones are antagonists in calcium metabolism, but work together in phosphate metabolism.

Endocrine Glands and Hormones

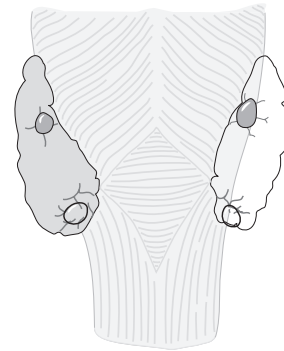
The Pituitary Gland

Small pea-sized organ, the pituitary gland is located under the hypothalamus on the sella turcica of the sphenoid bone. It is the master gland of the endocrine system. The pituitary gland is divided into three lobes that secrete different hormones.

- The anterior lobe (anterior pituitary, adenohypophysis) secretes hormones that act on other glands to stimulate or inhibit their hormonal production.
- The intermediate lobe is somewhat controversial. Certain researchers believe humans do not have one.
- The posterior lobe (posterior pituitary, neurohypophysis) is an extension of the hypothalamus.

The Thyroid and Parathyroid Glands

Shaped as a shield, the thyroid gland is the most voluminous gland in the body, and is located in the lower third of the neck in front of the pharynx. It is composed of two lobes connected by an isthmus. The parathyroid glands are two pairs of glands located behind the thyroid; they play a part in calcium and phosphorus metabolism.



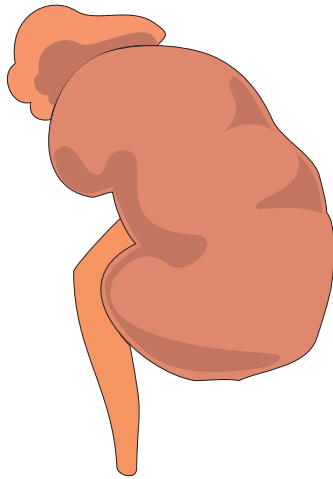
▲ Figure 2.6 Thyroid Glands

THYROID GLAND	
EFFECTS OF HYPERSECRETION	EFFECTS OF HYPOSECRETION
<ul style="list-style-type: none"> • Increased basal metabolism • Higher body temperature • Heat intolerance • Greater appetite • Weight loss • Irritability • Insomnia • Hypersensitivity to stimuli (nervous) • Exophthalmia (bulging eyes) • Changes in personality • Diarrhea (decreased ovarian function) • Damp, thin and red skin • Thin and soft hair • Soft and thin nails 	<ul style="list-style-type: none"> • Decreased basal metabolism • Lower body temperature • Cold intolerance • Loss of appetite • Weight gain • Lower blood pressure • Lower heart rate • Muscle cramps • Myalgia (muscle pain) • Constipation • Loss of muscle tone • Great fatigue (decreased ovarian function) • Pale skin • Thick, dry skin • Facial oedema • Thinner, rougher hair • Thick, hard nails • Loss of eyebrow tips

The Adrenal Glands

The yellowish brown adrenal glands sit atop the kidneys. They are divided into two parts, each of which produces its own hormones:

- The adrenal cortex;
- The adrenal medulla.



▲ **Figure 2.7** The Adrenal Gland

The Liver

The liver secretes a hormone, fibrinogen, which is involved in the coagulation of blood.

The Skin

The skin secretes histamines, which play an important role during allergies by generating oedema and erythema.

The Gonads

The gonads are genital glands: ovaries in women and testes in men.

The Ovaries

Feminine genital glands, they are located in the pelvis and are both exocrine (ovogenesis) and endocrine (oestrogen and progesterone).

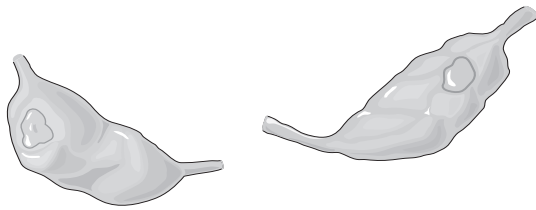
Ovarian Cycle

The ovarian cycle takes place in three phases that describe the evolution of the ovarian follicle over 28 days under the influence of pituitary gonadotropic hormones.

1. *Follicular phase*: It represents a brief period of growth and ripening for the Graafian follicle, from which the mature oocyte (ovum) will be released. This period lasts between 10 and 12 days. Before the ovum is released, the follicle produces oestrogen (folliculin) that favours uterine proliferation (each ovary alternately produces an ovum).
2. *Luteinic phase*: During this longer period, the follicle ruptures and the mature oocyte

is released and moves towards the uterus thanks to the movements of the Fallopian tube. In the period following the release, the corpus luteum, formed by the ruptured follicle, will produce a large amount of oestrogen and progesterone to activate the thickening of the endometrium.

3. On the 28th day, if fertilisation has not occurred, follicular production slows down and causes the ovum and part of the endometrium to be rejected during menstruation, which marks the start of a new cycle.



▲ Figure 2.9 The Ovaries

Menopause

Menopause is a period that generally occurs between 45 and 55 years of age, during which ovarian functions slow down. Various indicators may be observed, caused by a reduction in ovarian hormonal production:

- Rosacea
- Increase of fatty tissue (hips)
- Wider hips
- Cellulite
- Hyperpilosity

Pregnancy

During pregnancy, the placenta, a temporary endocrine gland, secretes hormones: oestrogen, progesterone, corticosteroids, chorionic gonadotropine, MSH (towards the end of pregnancy). During this period, certain signs may appear: pregnancy mask (chloasma), stretch marks, etc.

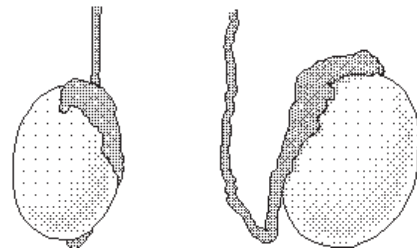
Testes

The testes are two glands suspended in protective sacs, the bursa, whose double external envelope forms the scrotum. In each testicle, spermatozoa are produced by the seminiferous tubules. Starting as spermatogonia, they become primary, then secondary spermatocytes, and finally, spermatozoa that represent the

exocrine secretions of the testes. Between the seminiferous tubules are the Leydig cells, endocrine portion of the testes. They namely secrete testosterone.

Testicular hormones

- Androgen (Testosterone)
 - Determines the development of primary (penis, scrotum) and secondary (hair growth, voice, behaviour, libido) sexual characteristics.
- Oestrogen



▲ Figure 2.10 The Testes

PITUITARY HORMONES		
SECRETING LOBE	HORMONES	ACTIONS
Anterior Lobe (anterior pituitary)	LH (luteinizing hormone)	Acts on gonad cells by stimulating the synthesis of sexual hormones Involved in ovulation
	FSH (follicle-stimulating hormone)	Activates the ripening of the Graafian follicle Stimulates the operation of gametes (sexual cells)
	ACTH (corticotropin)	Stimulates adrenal secretions Slightly stimulates mineralocorticoid secretion Involved in melanogenesis
	TSH (thyroid-stimulating hormone)	Stimulates and regulates the secretion of thyroid hormones
	STH (somatotropin)	Stimulates the growth of bones, muscles and organs Regulates nutritional balance Anabolic effect on proteins Phosphocalcic, lipidic and carbohydrate balance
	MSH (melanocyte-stimulating hormone)	Stimulates melanogenesis Weak lipolytic action
	Metabolic hormones	Act on carbohydrates, lipids and proteins
Posterior lobe (posterior pituitary)	ADH (antidiuretic hormone)	Favours the reabsorption of water by the kidney
	Oxytocin	Stimulates uterine contractions during childbirth Enhances the antidiuretic action of the posterior lobe

THYROID AND PARATHYROID HORMONES		
GLAND	HORMONES	ACTIONS
Thyroid	T4 (thyroxine, the most abundant) T3 (triiodothyronine) T2 (minor)	Increases oxygen consumption in tissues Increases basal metabolism and thermogenesis Accelerates growth and heart rate
	Calcitonin	Hypocalcemic hormone: - blocks calcium resorption in bones - increases calcemia and phosphaturia in kidneys - increases calcium absorption in the intestine
Parathyroids	Parathyroid hormone	Hypocalcemic hormone: - releases calcium and phosphate stored in the skeleton, thus causing bone resorption - increases phosphaturia and reduces calciuria in kidneys - increases calcium absorption in the intestine

ADRENAL HORMONES		
SECRETING PART	HORMONES	ACTIONS
Adrenal cortex	Glucocorticoid Cortisol	Involved in carbohydrate metabolism; transforms tissue proteins into glycogen Activate protein catabolism Cause lymphatic organ and muscle atrophy Disturb lipid metabolism (increased fatty tissue) Anti-inflammatory and anti-allergy oedema
	Mineralocorticoid Aldosterone	Regulate the sodium/potassium balance Cause potassium decrease, abundantly eliminated in urine
	Androgen hormones	Trigger the development of male sexual characteristics Stimulate protein anabolism and lipide metabolism (acné)
Adrenal medulla	Adrenaline	Accelerates heart rate: increases the strength and amplitude of heartbeats Increases blood pressure and glycemia
	Noradrenaline	Vasoconstrictive and hypertensive action Stimulates adrenergic receptors (production of adrenaline)

OVARIAN AND PLACENTA HORMONES		
LOCATION	HORMONES	ACTIONS
Ovaries (Graffian follicle)	Oestrogen	Causes the appearance of female sexual characteristics Triggers the thickening of the uterine lining Oedema
Corpus luteum	Progesterone	Anti-oestrogen hormone, secreted in the second phase of the ovarian cycle Stops the thickening of the uterine lining Transforms the uterine lining into pregravidic endometrium and favours the setting and development of the fertilized egg Inhibiting action on the contractibility and tone of the uterine muscle (pregnancy)
	Androgen hormones	Stimulate protein anabolism and lipid metabolism
Placenta	Oestrogen Oxytocin Progesterone Corticosteroid MSH (end of pregnancy)	Its presence in the blood allows early detection of pregnancy

GLAND	DYSFUNCTION	MANIFESTATIONS
Adrenal cortex	Hyperactivity (cortisol)	Lunar face Reddish skin Slow healing Cushing's syndrome (obesity of the face, neck and trunk, high blood pressure, osteoporosis, facial hypertrichosis, purple stretch marks)
	Hypoactivity (cortisol)	Weight loss Anorexia Skin hyperpigmentation Addison's disease (bronzelike skin pigmentation, pigment spots on mucous membranes)
	Hyperactivity (aldostérone)	Loss of elasticity and cutaneous thinning Oedema
	Hypoactivity (aldostérone)	Dehydration