The Endocrine System -
An Overview
The Endocrine System – An Overview

This booklet explains all about the endocrine system. The thyroid gland is part of the endocrine system. It may be helpful for people with a thyroid problem to understand which part the thyroid plays in the endocrine system. A Glossary of Terms is at the end of this booklet.

The endocrine system is a collection of glands that produce hormones (chemical messengers). These hormones pass directly into the bloodstream to control metabolism, growth and sexual development.

The endocrine system consists of the following glands:

- the hypothalamus
- the pituitary gland
- the pineal gland
- the thyroid gland
- the parathyroid glands
- the adrenal glands
- the pancreas
- the thymus
- the testes (male)
- the ovaries (female)

The hormones produced by these glands travel to various organs, glands and tissues in the body and communicate with them. Once they have reached their particular organ or tissue they bind to specific proteins on the surface of the cell. These proteins are called receptors. When they have bound to the receptor, this causes a response in that particular organ or tissue (they tell it what to do).

Sometimes things can go wrong in the endocrine system and various illnesses can be caused.
A Brief Overview of these Glands

The Hypothalamus

The hypothalamus is part of the brain. It receives messages from all over the body and keeps the body balanced by sending out messages to the Nervous System via the brain. It also sends out hormone messages to the pituitary gland and helps to regulate the control of thirst and hunger.

The Pituitary Gland

The pituitary gland is under the control of the hypothalamus and is connected to the hypothalamus by a stalk.

The pituitary gland has two lobes - the anterior lobe and the posterior lobe.

The anterior lobe of the pituitary gland produces the following hormones:

- **Follicle-stimulating Hormone** (FSH) and **Lutinizing Hormone** (LH) which control the production of the sex hormones (oestrogen and testosterone). They also control the growth and release of the egg from the ovaries. In men they control the production of sperm.

- **Growth Hormone** which controls growth.

- **Thyroid Stimulating Hormone** (TSH) which tells the thyroid gland to produce and release thyroid hormones.

- **Adrenocorticotropic Hormone** (ACTH) which tells the adrenals to release the hormone cortisol.

- **Melanocyte-Stimulating Hormone** (MSH) which controls the production of melanin. Melanin is the substance that gives skin its colour.

- **Prolactin** (PRL) which stimulates production of breast milk and is necessary for normal milk production during breast feeding.

The posterior lobe of the pituitary gland produces the following hormones:

- **Antidiuretic hormone** (ADH) which controls water excretion by the kidneys.

- **Oxytocin** which causes the womb to contract during labour and plays a role in the production of breast milk.
The Pineal Gland

The pea-sized pineal gland is near the centre of the brain. The pineal gland produces a hormone called melatonin. Melatonin is produced when it is dark so more is produced at night and in the winter. When nights are longer, the body makes more melatonin. Melatonin is the hormone which is responsible for closing the body down ready for sleep.

It also affects reproductive development and thyroid and adrenal cortex functions.

The Thyroid Gland

The thyroid gland is a small butterfly shaped gland with two lobes. It is situated in the front of your neck, just below the Adams Apple.

The thyroid gland produces two main hormones which are very important for growth and development. One is called thyroxine (T4) and the other is called triiodothyronine (T3). T4 is converted to T3 in the body’s cells and tissues. T3 is an active hormone and is needed by all of the cells and tissues of the body.

The thyroid gland also produces another hormone called calcitonin, which works alongside parathyroid hormone in the maintenance of calcium levels in the blood.

(More information can be found in our booklet, ‘The Thyroid Gland – An Overview’)

Parathyroid Glands

These pea-sized glands are attached to the thyroid gland and produce parathyroid hormone (PTH) which controls blood calcium levels.

The Adrenal Glands

The adrenal glands are situated at the top of the kidneys. Each adrenal gland is divided into two areas, the cortex and the medulla. Each area produces different hormones.

The cortex produces the following:

- **Corticosteroid hormones**

  **Cortisol** (also known as hydrocortisone) is the main stress-buster of the body and controls the body’s use of fats, proteins and carbohydrates.

  **Corticosterone** which helps to control the immune system’s inflammatory response (inflammation).
- **Mineralocorticoids**

  *Aldosterone* which helps to maintain sodium balance in the body and the maintenance of blood volume and blood pressure.

- **Gonadocorticoids**

  Sex hormones such as *testosterone, oestrogen, DHEA* and progesterone in small amounts.

The medulla produces:

- **Adrenaline and Noradrenaline** which are produced in response to acute stress such as fright and anger. These cause the heart to pump harder and the heart rate to increase. They also open airways into the lungs, increase blood flow to major muscle groups and enable the body to fight or run in a stressful situation.

**The Pancreas**

The pancreas produces digestive enzymes and certain special cells which control blood sugar, producing the hormones insulin and glucagon.

**The Thymus**

The thymus makes white blood cells called T-lymphocytes. These white blood cells are part of the body’s immune system and help to fight infection.

**The Testes**

The testes are two egg-shaped male reproductive organs. They produce the hormone testosterone, which is responsible for the male characteristics of the body. Testosterone is needed for the production of sperm. Men also produce a small amount of progesterone and oestrogen.

**The Ovaries**

The ovaries are two oval-shaped female reproductive organs. They produce the female sex hormones oestrogen and progesterone, which are responsible for the female characteristics of the body. Oestrogen strengthens bones and has a protective effect on the heart, and progesterone causes the womb’s lining to thicken ready for pregnancy. The ovaries also produce small amounts of testosterone.
Glossary of Terms

Anterior - situated before or at the front

Excrete - to expel from the body

Inflammation - redness, swelling, pain, tenderness, heat, and disturbed function of an area of the body

Lobe - a round projection or division such as ear lobe or the lobes of the thyroid gland

Metabolism - the chemical processes within the human body

Organ - part of the body that performs a special task such as heart and kidney

Posterior - situated behind or at the rear

Receptors - a specialised cell or group of nerve endings that responds to things such as hormones

Stimulate - to excite

Tissues - cells of the body such as muscles and nerves