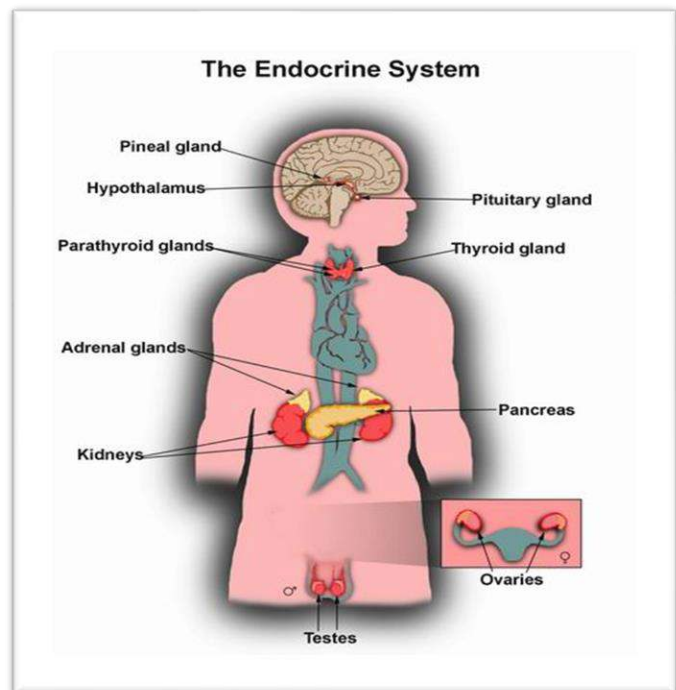


## The Endocrine System

### Overview

The term endocrine is derived from the Greek words "endo" meaning within, and "crinis" meaning secrete. The endocrine system affects the function of every cell, tissue and organ in the human body. The system is made up of several glands, each gland consists of a network of cells that together produce and secrete chemicals. The chemicals are called hormones and they function to regulate metabolism, growth, tissue function and mood. Although many different hormones circulate throughout the bloodstream, each one affects only the cells that are genetically programmed to receive and respond to the specific hormone. Hormones assist in maintaining homeostasis, which is the regulation of a constant internal environment.



### Anatomy

Gland	Function and Hormones Produced
<b>Hypothalamus</b>	The hypothalamus is located in the lower brain, and is about the size of a small pearl. It is connected via axons of nerves to the pituitary gland and many of the hormones released by the hypothalamus regulate those released by the pituitary gland. The hypothalamus is involved with homeostasis, food and water intake regulation and is also part of the limbic system, therefore it is involved with some more primitive emotions such as fear, anger and sexual behaviour.
<b>Pituitary</b>	<p>The pituitary gland regulates the actions of many other glands in the body. Located just below the hypothalamus, it is divided into an anterior and posterior lobe. The anterior lobe is regulated by the hypothalamus and produces the following hormones:</p> <ul style="list-style-type: none"> <li>❑ growth hormone - stimulates growth of bone and tissue;</li> <li>❑ thyroid stimulating hormone (TSH) - stimulates the thyroid gland to produce thyroid hormones;</li> <li>❑ adrenocorticotropin hormone (ACTH) - stimulates the adrenal gland to produce several related steroid hormones;</li> <li>❑ luteinizing hormone (LH) and follicle stimulating hormone (FSH) - hormones that control sexual function and production of the sex steroids, oestrogen and progesterone in females or testosterone in males; and</li> <li>❑ prolactin - hormone that stimulates milk production in females.</li> </ul> <p>The posterior lobe is different from the anterior lobe as it does not produce hormones, however it does secrete two hormones, which are actually synthesised in the hypothalamus and transported down nerve terminals to the posterior pituitary gland.</p> <ul style="list-style-type: none"> <li>❑ antidiuretic hormone (vasopressin) - controls water loss by the kidneys.</li> <li>❑ oxytocin - contracts the uterus during childbirth and the delivery of the placenta and stimulates milk production.</li> </ul>

<b>Pineal</b>	The pineal gland is located in the middle of the brain. It secretes a hormone called melatonin, which helps regulate the sleep/wake cycle of the body.
<b>Thyroid</b>	<p>The thyroid gland is located in the lower front part of the neck, it is butterfly shaped. It produces the hormones thyroxine and triiodothyronine, which regulate the metabolism. The more of these hormones that are released, the quicker we burn energy. Thyroid hormones also help maintain normal blood pressure, heart rate, digestion, muscle tone, and reproductive functions.</p> <p>The thyroid gland also produces the hormone calcitonin, which stimulates osteoblasts, which are cells responsible for bone growth.</p> <p>Attached to the back of the thyroid gland are the parathyroids, four small glands about the size of a grain of rice that produce the parathyroid hormone. Parathyroid hormone controls the amount of calcium in the blood and within the bones.</p>
<b>Adrenal</b>	<p>The adrenal glands are pyramidal in shape and located at the top of each kidney. The adrenal glands can be separated into two parts, the outer part which is called the adrenal cortex and the inner part which is known as the adrenal medulla. The adrenal cortex produces hormones which regulate salt and water balance, the body's response to stress, the immune system and sexual development and function. These hormones are called glucocorticoids, mineralcorticoids and sex steroids and amazingly are all derived from cholesterol.</p> <p>The adrenal medulla produces hormones that help the body cope with physical and emotional stress by increasing the heart rate and blood pressure. They are called catecholamines and are known as adrenaline (epinephrine) and noradrenaline (norepinephrine) which are involved in the fight or flight response.</p>
<b>Pancreas</b>	The pancreas is a long organ which is located at the back of the abdomen, behind the stomach. The pancreas has both digestive and hormonal functions. The digestive or exocrine part of the pancreas releases digestive enzymes. The hormonal or endocrine part of the pancreas secretes hormones including those that regulate the level of sugar in the blood, called insulin and glucagon.
<b>Reproductive Glands</b>	<p>In males, the reproductive glands are the testes, which are located in the scrotum and produce hormones responsible for typical male characteristics and sperm production. These hormones are called androgens, the most important of which is testosterone.</p> <p>In females, the reproductive glands are located in the ovaries in the abdomen, and produce hormones responsible for typical female characteristics and are involved in reproductive functions. These hormones are oestrogen and progesterone.</p>

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