

# The edocrine system



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The endocrine system The endocrine system is a collection of ductless glands which are positioned through the whole body. The endocrine glands pass their secretions of hormones directly into the blood stream so that they are always adjacent to blood vessels. Hormones are chemicals in the body produced and secreted in the body that regulate the function of a particular tissue or organ (Bing dictionary). These chemical messengers transfer information from one set of cells to another.

Despite many chemicals being transmitted and circulated around the body via the bloodstream, each one only acts on the cells that are genetically programmed to receive and respond to its message. Hormone levels can be influenced by many factors including stress, infection and changes in the balance of fluids within the body. A gland is a group of cells that produce and secrete chemicals ([http://kidshealth.org/parent/general/body\\_basics/endocrine.html](http://kidshealth.org/parent/general/body_basics/endocrine.html)). A gland will select and eliminate waste materials from the blood, then process it and secrete the end product for use at another location in the body.

Endocrine glands release more than 20 major hormones straight into the bloodstream and from here they can be transported to the cells in other parts of the body. There are many major glands that make up the endocrine system and these include the: hypothalamus, pituitary, thyroid, parathyroid, adrenals, pineal body and the reproductive glands (testes for males and ovaries for females). The pancreas is also involved in secreting hormones which are involved with the maintaining of blood sugar levels within the body.

The pancreas is also associated with the digestive system as it produced hydrolytic enzymes which aid with digestion. Neuro- endocrine system The nervous and endocrine systems control all the biological processes within the body and they can almost control one another. The nervous system can stimulate or inhibit the release of certain hormones while the endocrine system can promote or inhibit nerve impulses. Hypothalamus The hypothalamus is found in the lower part of the brain and is a collection of particular cells.

It has key links with the nervous system and the endocrine system and has an important role in secreting hormones. The nerve cells in the hypothalamus control the pituitary gland by producing certain chemicals that can stimulate or suppress hormone secretions from the pituitary gland. The pituitary gland is moderately small and is located at the base of the brain beneath the hypothalamus. It produces hormones that control other endocrine glands within the body. The hypothalamus can convey information sensed by the brain to the pituitary gland to make any changes that could be influenced by factors like emotions and seasonal changes.

The pituitary Gland The pituitary gland is divided into 2 sections: Anterior lobe This regulates the activity of the thyroid, adrenals, and reproductive glands. It also produces growth hormone which stimulates the growth of bone and other body tissues. It also produces prolactin which stimulates mammary gland growth and activates milk production in females. Thyrotropin is another hormone produced and this stimulates the thyroid gland to produce thyroid hormones. Corticotrophin is produced which causes the adrenal glands to produce certain hormones.

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Follicle-stimulating hormone (FSH) is also produced and affects ovaries in females and stimulates the development of oocytes. It also affects the testes of males and stimulates the production of sperm. Luteinizing hormone (LH) affects the ovaries in females and stimulates ovulation, the formation of the corpus luteum and results in secretion of oestrogen and progesterone. It affects the testes of males and stimulates the production of testosterone. The pituitary gland also secretes endorphins. These are chemicals that act on the nervous system and allow us to reduce our sensitivity to pain.

It also triggers the reproductive organs to release sex hormones such as testosterone in males, and estradiol and progesterone in females which play a part in the menstruation cycle. Posterior lobe This releases antidiuretic hormone and this encourages reabsorption of water by the kidneys. The posterior lobe also produces the hormone called oxytocin and this helps induce labour and produces milk in the mammary glands of females. Another hormone produced in the posterior lobe is Melanocyte-stimulating hormone (MSH) and this helps with the darkening of the skin. Hull. R, Anatomy & Physiology for Beauty and Complementary Therapies, the Write Idea Ltd, 2009) Thyroid The thyroid is positioned in the lower region of the neck at the front and it produces a hormone called thyroxine. This is an amino acid derivative and increases the metabolic rate and heart rate. It also promotes growth within the body. Another development also, and helps with body temperature and plays a role in metabolism. Calcitonin is another hormone formed which targets bones and lowers the level of calcium in the blood.

The production and release of these thyroid hormones is controlled by Thyrotropin and this is secreted by the pituitary gland. If a person has more

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thyroid hormones circulating in the blood stream, the chemical reactions within the body will occur much quicker. Parathyroids There are 4 small glands that are attached to the thyroid called the parathyroids. These release a hormone called parathyroid hormone and this adjusts the level of calcium in the blood with the help of calcitonin, which is also formed in the thyroid. ([http://kidshealth.org/teen/your\\_body/body\\_basics/endocrine.html](http://kidshealth.org/teen/your_body/body_basics/endocrine.html)). It also decreases the level of phosphate in the blood and promotes the formation of calcitriol by the kidneys. Thymus The thymus gland plays an important role in the immune system and secretes numerous hormones. One of these is thymosin and this promotes the growth of T- Cells which are a type of white blood cell. (Hull. R, Anatomy & Physiology for Beauty and Complementary Therapies, the Write Idea Ltd, 2009). Adrenal Glands The adrenal glands are situated above each kidney and release many hormones that are important in the body.

The adrenal glands are divided into 2 sections and each one has a particular function: Adrenal cortex The adrenal cortex produces steroid hormones that are essential in the body. These hormones are grouped into mineralcorticoids, glucocorticoids and sex hormones. This produces corticosteroids that regulate water and salt balance in the body. They also play a role in the bodys response to stress and help maintain metabolism. The adrenal glands also produce mineralcorticoids (mainly aldosterone) and this acts on the kidneys.

It regulates the mineral content of the blood by increasing blood levels of sodium and water, it also decreases blood levels of potassium. Sex hormones called androgens and oestrogens are also produced in the adrenal cortex  
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and these have a small contribution to sex drive and libido. The adrenal medulla is innervated by neurones of the sympathetic branch of the ANS and can quickly release hormones called catecholamines. One example of this is epinephrine (also known as adrenaline) and this produces many effects which are related to short-term stress response.

It is also responsible for the "fight or flight" response which is triggered during times of stress. This increases blood pressure and heart rate (from own personal notes). Another hormone called norepinephrine (also known as noradrenaline) plays a role in the body's response to stress. It decreases the rate of digestion and stimulates cellular metabolism. Pineal Gland The pineal gland is located in the middle of the brain and it secretes a hormone called melatonin and this regulates sleep patterns in the body.

Reproductive glands In males the reproductive gland is the testes. It produces a hormone called testosterone which regulates the development and maintenance of secondary sex characteristics. In females the reproductive gland is the ovaries. A hormone produced is estradiol which regulates the development and maintenance of secondary sex characteristics. Another hormone produced is progesterone and this prepares the uterus for pregnancy and is involved in the regulation of the menstrual cycle in females. Pancreas

The pancreas is also involved in secreting hormones around the body and also links with the digestive system as it secretes digestive and hydrolytic enzymes. The pancreas produces 3 hormones. Insulin: this is secreted from the beta-cells of the islets of Langerhans in the pancreas and is secreted in

reply to a raised blood glucose concentration. The effect of insulin is that it lowers blood glucose concentration to normal levels. The modes of action for this are that it stimulates the absorption of glucose from the blood by the muscle fibres, liver cells and adipose cells.