

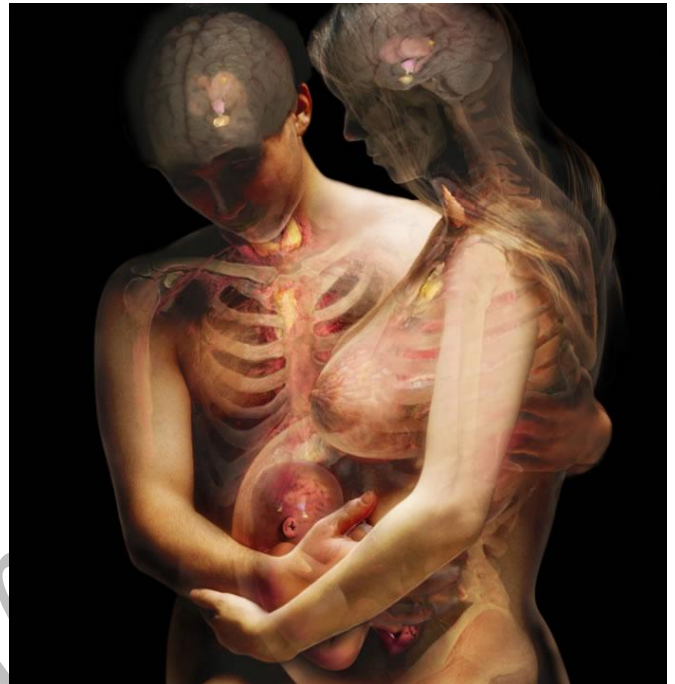


The Endocrine / Reproductive System

The Endocrine System

The Endocrine System is one of main controlling system in the body. The endocrine system works closely with the nervous system in maintaining a steady state within the body. While the nervous system tends to produce a rapid response by using electrical/chemical stimuli, the endocrine system works much slower and over a longer period of time.

The endocrine system produces and releases hormones into tissue fluids and into the bloodstream. Hormones act as messengers that act to regulate organs in other parts of the body. Hormones are designed to act only on specific tissues within the body, creating a physiologic response by the receptor organ. Hormones are regulated by a negative feedback system, which keeps the hormones in balance by activating and curtailing the release of hormones. Disorders in an endocrine gland result in a physiological imbalances.



Hypothalamus

The nervous and endocrine systems are linked by the hypothalamus gland, which stimulates or inhibits the activity of the pituitary gland.

Pituitary

The pituitary gland is called the master gland, in that it releases hormones that affect the workings of other glands in the body. It is located within the brain, just behind the point in which the optic nerves cross. The pituitary is broken down into two parts, the anterior lobe, which releases hormones when stimulated by the hypothalamus, and the posterior lobe, which stores hormones, produced by the hypothalamus and is released when they are stimulated by the nervous impulses.

Hormones controlled by the anterior lobe of the pituitary include:

- Human Growth Hormone (Somatotropin) - act by increasing amino acid uptake and promoting protein synthesis in most tissues.
- Thyroid Stimulating Hormone - stimulates the thyroid gland to produce hormones.
- Adrenocorticotrophic Hormone - stimulates the adrenal cortex of the adrenal glands.
- Prolactin - stimulates the production of breast milk in females.

- Follicle Stimulating Hormones - stimulates the development of eggs in the ovaries and sperm in the testes.
- Luteinizing Hormone - causes sex hormone secretion in both males and females and also causes ovulation in females.

Hormones released by the posterior lobe of the pituitary include:

- Anti-diuretic Hormone - helps the body to conserve water by promoting the re-absorption of water from the kidneys.
- Oxytocin - causes contraction of the uterine muscles and promotes the release of milk from the breast.

Pineal Gland

The pineal gland is a small structure located in the mid-brain. The pineal produces the hormone melatonin, which helps to regulate the sleep cycles.

Thyroid Gland

The thyroid gland is the largest endocrine gland in the body. Made up of two lobes that sit on either side of the larynx, the thyroid gland releases thyroxine, which increases energy metabolism and protein metabolism.

Parathyroid Gland

Embedded in the rear of the thyroid gland, are four tiny bodies called the parathyroid gland. The parathyroid glands are responsible for calcium metabolism, particularly the release of calcium from the bone tissues, thus increasing the amount of calcium circulating in the bloodstream.

Thymus

The thymus gland is a collection of lymph tissue that lies in the centre of the chest, just above the heart. This gland is critical for the development of immunity and the development of T-lymphocyte (T-cells).

Adrenal Glands

The adrenal glands are located just above the kidneys. The Adrenals are made up of two separate parts that have independent functions. The inner area called the medulla releases two hormones, adrenaline and nor epinephrine, which controls our fight-or-flight response.

Physiological actions that occur when this gland is stimulated include:

- The contraction of the walls of the arterioles, which causes blood pressure to rise.
- Conversion of glycogen in the liver to glucose, in order to produce that emergency energy required.
- An increase of the heart rate.
- An increase in metabolic rate of body cells.
- Dilation of the bronchioles.

The outer portion of the adrenal gland, the adrenal cortex, secretes three types of hormones. They include:

- Glucocorticoids - maintain the carbohydrate reserves in the body, as well as to suppress the inflammatory response of tissues.
- Mineral corticoids - help to regulate the electrolyte balance in the body by controlling the re-absorption of sodium and secretion of potassium by the kidneys.
- Sex hormones - are secreted in small amounts. While slight in their effects, this source of sex hormones becomes important as a woman reaches menopause.

Islets of Langerhans

The Islets of Langerhans are specialized cells that are located on the pancreas which secrete the hormones insulin and glucagon. The correct amounts of insulin and glucagon are required in to regulate blood sugar levels. Insulin is required to transport glucose (a form of simple sugar) into the cells to be used for energy.

Insulin is also used to lower the level of sugar in the blood by increasing the rate at which the liver converts glucose into glycogen for storage in fatty tissues. Glucagon, on the other hand, causes the liver to convert glycogen back to glucose and release it back into the blood stream for use by the cells for energy.

Ovaries

The ovaries produce two hormones oestrogen and progesterone that are responsible for the stimulation and preparation of the uterus for pregnancy.

Testes

The testes produce the hormone testosterone, which is responsible for development and maintenance of primary and secondary male sexual characteristics.

Kidney

While the kidneys are not typically thought of as secreting hormones, the kidneys actually do secrete two different hormonal substances:

- Renin - helps to regulate blood pressure.
- Erythropoietin - stimulates the production of red blood cells.

The Reproductive System

Although the reproductive systems of males and females are different, the organs of both sexes can be divided into two groups, the primary organs, or the gonads and the accessory organs, which include a series of ducts that transport the egg or sperm, as well as various endocrine glands.

Male Reproduction

The Testes

The testes are located outside the body proper and are suspended in a sac called the scrotum. The function of the testes is to produce spermatozoa, which is essential for the proliferation of life. The testes also produce the hormone testosterone, which is required to maintain the reproductive structures as well as to develop secondary sexual characteristics.

Epididymis

The epididymis is a highly coiled tube in which sperm complete the maturation process and are stored.

Vas Deferens & Ejaculatory Duct

The vas deferens and ejaculatory duct are a tube that connects the epididymis to the urethra.

Seminal Vesicles

The seminal vesicles are a sack like glands that secrete a mucus-like fluid that contains nutrients that nourish the sperm cells.

Prostate Gland

The prostate gland lies just below the bladder, where it surrounds part of the urethra. The prostate produces an alkaline secretion, which helps neutralize the acidity of the vaginal tract as well as enhances the mobility of the spermatozoa. The muscular tissue that makes up the prostate gland also aids in the expulsion of semen.

Bulb urethral (Cowper's gland)

The bulb urethral or Cowper's Gland secretes a clear alkaline fluid, which neutralizes the acidity of the urethra and also lubricates the urethra and penis.

The Penis

The penis is an erectile organ designed to deliver sperm into the female reproductive tract during intercourse.

Female Reproduction

Ovaries

The ovaries are two small organs in which the ova or eggs are formed and released. Each month only one is released for potential fertilization. The ovaries are also responsible for the secretion of oestrogen and progesterone.

Oviducts (Fallopian Tubes)

The oviducts or fallopian tubes are muscular structures that transport the ova from a point near the ovary to the uterus.

Uterus

The Uterus is the organ in which a fertilized egg is embedded, allowing for the growth of a foetus until it reaches maturity. The opening to the uterus is called the cervix. It is through this opening that sperm enters into the uterus thus allowing for fertilization of the ovum.

Vagina

The vagina is a muscular tube that connects the uterus to the outside world.

Breasts

The breasts contain mammary glands, which are responsible for the production of milk during lactation.

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