

THE ENDOCRINE SYSTEM NOTES

The endocrine system produces hormones that function to control and regulate many different body processes. The endocrine system coordinates with the nervous system to control the functions of the other organ systems. Cells of the endocrine system produce molecular signals called hormones. These cells may compose endocrine glands, may be tissues or may be located in organs or tissues that have functions in addition to hormone production. Hormones circulate throughout the body and stimulate a response in cells that have receptors able to bind with them. The changes brought about in the receiving cells affect the functioning of the organ system to which they belong. Many of the hormones are secreted in response to signals from the nervous system, thus the two systems act in concert to effect changes in the body.

How Hormones Work

Hormones cause changes in target cells by binding to specific cell-surface or intracellular hormone receptors, molecules embedded in the cell membrane or floating in the cytoplasm with a binding site that matches a binding site on the hormone molecule. In this way, even though hormones circulate throughout the body and come into contact with many different cell types, they only affect cells that possess the necessary receptors.

Receptors for a specific hormone may be found on or in many different cells or may be limited to a small number of specialized cells. For example, thyroid hormones act on many different tissue types, stimulating metabolic activity throughout the body. Cells can have many receptors for the same hormone but often also possess receptors for different types of hormones. The number of receptors that respond to a hormone determines the cell's sensitivity to that hormone, and the resulting cellular response. Additionally, the number of receptors available to respond to a hormone can change over time, resulting in increased or decreased cell sensitivity.

What are endocrine glands?

- pituitary gland and hypothalamus
- pineal gland
- thyroid and parathyroids
- pancreas
- adrenal glands
- ovaries and testes

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- Hypothalamus: Controls the pituitary gland; links the nervous and endocrine systems.
- Pituitary Gland: Known as the "master gland," it produces hormones that regulate other endocrine glands, growth, and water retention.
- Pineal Gland: Releases melatonin to regulate the sleep-wake cycle (circadian rhythm).
- Thyroid Gland: Produces hormones (*T3*, *T4*) that control metabolism, energy levels, and development.
- Parathyroid Glands: Four tiny glands that regulate blood calcium levels.
- Adrenal Glands: Situated atop the kidneys, they produce adrenaline (stress response) and cortisol (metabolism, blood pressure).
- Pancreas: Secretes insulin and glucagon to manage blood sugar levels.
 - When your blood sugar is too high, your pancreas makes insulin to lower it. When your blood sugar is too low, your pancreas makes glucagon to increase it.
- Gonads: Testes (male) and Ovaries (female) produce reproductive hormones (testosterone, estrogen, progesterone).
- Thymus: Produces white blood cells (T cells) for immune defense, particularly active in childhood