

1. General Information

The endocrine system regulates growth, reproduction, and homeostasis
The endocrine system includes all glands and hormones

2. The Human Endocrine System

Gland – organs that produce secretions

Exocrine Glands – glands that have ducts that lead to the site of action

Endocrine Glands – glands that secrete their chemicals, known as hormones, into the bloodstream

Target Organs – the organs in which the hormones produced by glands are acted upon

Hormones bind to their target site much like antibodies bind to antigens

High levels of certain hormones can be fatal

Sometimes, the hormone cannot control the event directly, and must do so indirectly

Glucagon, a hormone from the pancreas, binds with receptor in the liver

The bond causes the liver to undergo a series of change and produce enzymes

Glucagon has not directly caused the production of the enzymes, but has indirectly controlled it

The Feedback System – a method to control the amount of hormones secreted

Since conditions are constantly changing, the feedback system allows hormone levels to adjust

A negative feedback loop decreases gland activity due to an increase in what it regulates

A positive feedback loop increases its activity due to a decrease in what it regulates

3. The Pancreas and Blood Glucose

Pancreatic Islets – the Islets of Langerhans – endocrine cells in the pancreas

Glucagon – when blood sugar levels are low, glucagon's secretion increases

More glucagon speeds up conversion of glycogen – glucose, increasing sugar levels

Insulin – opposite effect of glucagon, slows down conversion of glycogen – glucose, lowering levels

Hormones such as growth hormone, corticotrophin hormones, and adrenaline also affect glucose levels

4. Control of Blood Calcium

Parathyroid Glands – located on the thyroid, there are 4 of them

Parathyroid Hormone (PTH) – secreted by the parathyroid glands

As blood calcium rises, less PTH is secreted. As calcium decreases, more PTH is secreted

PTH controls the amount of calcium that is absorbed by the bones and muscles

Calcitonin – a hormone by the thyroid that promotes absorption of calcium by bones

Lowers the calcium level of the blood, opposite of PTH

5. Other glands and Hormones

Pineal gland – a gland that secretes **melatonin**, which supposedly promotes sleep

Thymus Gland – manufactures T cells needed for the immune system

Prostaglandins – a hormone that regulates blood vessel diameter, blood clotting, ovulation, etc.

Bradykinins – polypeptides that remove heat from the body through sweat

6. The Pituitary Gland and the Hypothalamus

A gland that secretes many hormones essential to homeostasis

Controlled by the hypothalamus of the nervous system

CRH – secreted by the hypothalamus, stimulates secretion of ACTH

ACTH – Pituitary gland, cause the secretion of glucocorticoids by the adrenal cortex

TRH – secreted by the hypothalamus, stimulates secretion of TSH

TSH – Pituitary gland, stimulates the secretion of thyroid hormones by the thyroid gland

GHRH – secreted by the hypothalamus, stimulates the release of GH

Somatostatin - secreted by the hypothalamus, slows the secretion of GH

GH – Pituitary gland, promotes protein synthesis and growth, increased blood glucose

GnRH – secreted by the hypothalamus, stimulates secretion of FSH and LH

FSH – Pituitary gland, promotes gamete production and sex hormone secretion

LH – Pituitary gland, sex hormone secretion, ovulation and formation of corpus luteum (Ch 11)

PIH – secreted by the hypothalamus, inhibits prolactin secretion

Prolactin – Pituitary gland, hormone that promotes milk production

ADH – Pituitary gland, water retention, constriction of blood vessels

Oxytocin – Pituitary gland, mammary gland and uterine contraction

7. Adrenal Cortex Hormones

There are two adrenal glands, one on top of each kidney

Adrenal Cortex – the outer part of the adrenal gland

Adrenal Medulla – inner part of the adrenal gland

Corticosteroids – the group of hormones secreted by the Adrenal Glands

Glucocorticoids – regulates metabolism of carbs, fats, and proteins, fights inflammation

Gonadocorticoids – supplement the action of sex hormones produced by the gonads

Mineralocorticoids – regulates levels of electrolytes (Na^+ and K^+) in intercellular fluids

Epinephrine (Adrenaline) – increases mental alertness, heartbeat, respiratory rate, and metabolism

Norepinephrine – see Adrenaline

The Fight or Flight Response – the ability to suddenly secrete more hormones to deal with emergencies

8. Stress

Stress is the body's response to disruption of homeostasis that is not promptly resolved

Stress doesn't necessarily have to be bad, it can even be good

But then too much of a good thing is bad

Stressors – the factors that cause stress

Stressors stimulate the release of adrenaline