

The Endocrine System: Regulating the Body's Chemistry

1 videocassette.....23 minutes

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800-323-9084
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CREDITS

Author and Producer: Peter Cochran

Videography: Peter Scheer
Dan Duncan

Narrators: Richard Cassell
Randy Kaye

Curriculum Consultant: Michael Worosz

Our appreciation to: David Bloomgarden, M.D.
Ellen Friedman, Ph.D. Cheryl
Katz, Ph.D.

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INTRODUCTION

How do people grow? How do boys and girls develop sexually into men and women? How does the body react to stress? What causes diabetes?

The answers to these and many other questions lie in the operations of the human endocrine system. The endocrine system consists of glands and tissues that secrete hormones, chemical messengers that regulate many of the activities of the human body.

The Endocrine System: Regulating the Body's Chemistry gives students an introduction to this body system. The video provides an overview of the major endocrine glands and the hormones they secrete. It illustrates key points with examples that relate to the students' own lives. Interviews with an endocrinologist and a young diabetic reinforce the importance of the endocrine system to our health.

After viewing the program students will appreciate that while most endocrine glands are small, their effects on the body are great.

Grade Level: the video is designed for grades 6-8. It can be effectively used by older students as well.

OBJECTIVES

After viewing the program, students will be able to:

- describe the location and function of the major endocrine glands.
- explain the role of hormones in regulating metabolism, growth, and other body processes.
- explain how the nervous and endocrine systems interact.
- describe the role of the brain's hypothalamus in maintaining the right levels of hormones in the body.
- explain how diabetes is an example of the endocrine system failing to function correctly.

PROGRAM SUMMARY

The video begins by comparing a city to the human body. Both are made up of many different parts whose activities need to be carefully regulated. Graphics illustrate how the body has two main systems for coordinating and regulating its activities: the nervous system and the endocrine system.

The video introduces endocrine glands and the hormones they secrete.

It describes how hormones are chemical messengers that communicate with different parts of the body. The program explains that endocrine glands secrete hormones into the bloodstream, which carries them elsewhere in the body.

When a hormone reaches a target cell, it causes the cell to respond in a specific way. The program uses the parathyroid glands as an example. The hormone released by the parathyroids causes target cells in the bones to release calcium, which the body needs.

The program shows students in different scenes, focusing on how the endocrine and nervous systems are different yet interact. It shows a student reacting almost instantaneously to touching a hot iron. His nervous system senses the heat and causes him to pull back his hand. Then the video shows how the endocrine system reacts more slowly to danger. It shows a student walking down a dark alley. The video describes how hormones from the adrenal glands cause his heart to beat faster, increase his blood pressure, and direct blood to his muscles and brain. These responses together are called the "fight or flight response." The program then shows how giving a music recital evokes a similar response, making a young pianist more alert.

The video introduces Dr. David Bloomgarden, an endocrinologist, who explains that the body must maintain just the right levels of hormones. The video shows a student shivering in snow. The hypothalamus, part of the brain, monitors the student's internal temperature. When it is too cold, the hypothalamus signals the pituitary gland to release a hormone. This hormone stimulates the thyroid gland to secrete another hormone, thyroxine, which speeds up metabolism.

The program then focuses more on the role of the brain's hypothalamus. The hypothalamus constantly monitors conditions inside the body and signals the nearby pituitary gland to release a variety of hormones. Dr. Bloomgarden describes how the pituitary is often called the master gland

because it directs the actions of other endocrine glands to secrete their hormones. The video compares the pituitary to a conductor of an orchestra who directs individual musicians when to play.

The next part of the program explores other examples of different endocrine glands and their hormones. The video shows a child being measured and describes how the pituitary releases growth hormone. Photographs of a student over a number of years documents the changes of puberty. The program describes how the testes and ovaries secrete hormones that cause sexual changes in boys and girls.

The program describes how different hormones affect pregnancy, birth, breast feeding, menopause and other changes that occur as people age. It also describes how the thymus plays an important role in protecting us from disease.

The video then describes the role of the pancreas and insulin in maintaining the correct levels of the sugar glucose in the bloodstream. An interview with a young diabetic shows what happens when the pancreas doesn't function correctly.

Dr. Bloomgarden then explains how hormones affect human emotions, particularly depression.

A brief summary reiterates the major points.

REVIEW QUESTIONS

1. What are the two main body systems that regulate the activities of the body?
The two main body systems that regulate the activities of the body are the nervous system and the endocrine system.
2. What makes up the endocrine system?
The main components are endocrine glands.
3. What are hormones?
Hormones are chemical messengers secreted by endocrine glands.
4. How do hormones function?
They act on target cells, causing them to produce or to stop producing a product.
5. What hormone do the parathyroid glands secrete and what does this hormone do?
The parathyroid glands secrete parathyroid hormone. Parathyroid hormone acts on bone cells and causes them to release calcium.
6. What is the fight or flight response?
The fight or flight response occurs when the adrenal glands release the hormones epinephrine and norepinephrine. These hormones cause the heart to beat faster and blood pressure to rise. They also direct blood to the brain and muscles. All these responses prepare the body to either fight or run away.

7. How does the thyroid gland help maintain a fairly constant internal temperature?
The thyroid secretes a hormone called thyroxine which increases the amount of heat produced by cells.
8. How is the hypothalamus like a thermostat?
It monitors conditions inside the body just as a thermostat monitors heat inside a house.
9. How is the pituitary gland like the conductor of an orchestra?
The pituitary directs the actions of other endocrine glands just as a conductor directs the musicians in an orchestra.
10. What are some of the changes that occur during puberty?
Girls develop breasts, fat around their hips and body hair. Boys grow hair on their face and other parts of their bodies, and their voices become deeper.
11. What is the role of the pancreas?
The pancreas secretes a hormone called insulin that regulates the amount of glucose in the blood.
12. What is diabetes?
Diabetes is a disease in which the pancreas fails to secrete insulin or secretes insufficient amounts of glucose.

ACTIVITIES AND DISCUSSION QUESTIONS

1. To explain how hormones function with target cells, the program uses the example of protein hormones for the sake of simplicity. Protein hormones attach to receptors on a cell membrane. Other kinds of hormones, called steroid hormones, function differently. Steroid hormones pass through the cell membrane and attach to receptors in the cytoplasm.

Ask advanced students to research and report on the differences between protein hormones and steroid hormones.

2. Endocrine glands are not the only type of gland. The body also has many exocrine glands. Exocrine glands have ducts that secrete their products directly to where they are needed. Examples of exocrine glands include salivary glands, sweat glands and tear glands.

Endocrine glands, in contrast, are ductless glands that secrete their products into the bloodstream. Their targets may be far from the glands themselves.

Discuss with students the differences between endocrine and exocrine glands. Ask them why the body's circulatory system plays a key role in the functioning of the endocrine system by transporting hormones to where they are needed.

3. The program discusses the importance of the pituitary gland. The pituitary gland actually consists of two distinct parts, the anterior pituitary and posterior pituitary. Ask students to research and report on the differences between the two and the different hormones they secrete.

4. The video discusses the importance of insulin in the regulation of blood sugar levels. Insulin keeps glucose levels from becoming too high. Another hormone, glucagon, also plays a key role in the regulation of glucose levels. Glucagon is also secreted by cells in the pancreas. If levels of glucose are too low, glucagon increases the levels.

Ask students to research and report on the role of glucagon in regulating glucose levels. Ask them why it is important that the pancreas secretes both insulin and glucagon.

5. Ask students to research and describe in more detail one of the endocrine glands referred to in the video. They can also report on a hormone or endocrine gland not mentioned, such as the pineal.
6. The endocrine system helps maintain homeostasis in the body. Homeostasis is the maintenance of a stable internal environment. Homeostasis is maintained by a process called negative feedback. In negative feedback, a stimulus produces a response that reduces the stimulus.

A thermostat is an example of how negative feedback works. A drop in temperature is a stimulus that produces the response of turning on a furnace. The heat from the furnace raises the temperature, causing the furnace to turn off.

Ask students how negative feedback works in the example in the video of the boy shivering in the cold. If students have trouble, help them by reminding them that the hypothalamus acts as the body's thermostat. It signals the thyroid gland to secrete or stop secreting thyroxine. Thyroxine causes cells to release more heat.

GLOSSARY

adrenal glands: two glands lying one above each kidney. They produce hormones involved in metabolism and the fight or flight response.

adrenalin: hormone produced by adrenal gland. It is also known as epinephrine.

diabetes: disease caused by insufficient amounts of insulin being produced by the pancreas.

endocrine gland: ductless gland that secretes hormones.

endocrine system: system of glands that secrete chemical hormones that help control body functioning.

endocrinologist: doctor specializing in disorders of the endocrine system.

epinephrine: hormone that is secreted by the adrenal glands in times of stress. It is also known as adrenalin.

estrogen: hormone produced by ovaries.

fight or flight response: response initiated by the secretion of epinephrine, norepinephrine and other hormones that prepare the body to either fight or run away.

glucose: type of sugar that is a major source of energy for cells.

growth hormone: a hormone produced by the pituitary gland.

hypothalamus: the part of the brain that helps regulate activities of the pituitary gland.

insulin: hormone produced by pancreas that reduces the level of glucose in the blood.

menopause: period when menstruation has permanently ceased.

menstruation: periodic breakdown and discharge of the lining of uterine wall.

nervous system: brain, spinal cord, nerves, and the neural parts of sense organs.

ovaries: female reproductive organs that secrete the hormone estrogen.

oxytocin: hormone released by the pituitary that stimulates the contraction of the uterus and the release of milk.

pancreas: large gland that aids in digestion and also secretes the hormone insulin.

parathyroid gland: one of four endocrine glands embedded in the thyroid

parathyroid hormone: hormone secreted by parathyroid gland. It regulates the body's use of calcium.

pituitary: gland that secretes many different kinds of hormones including growth hormone and hormones that act on other endocrine glands.

puberty: age at which secondary sex characteristics appear.

receptor: site on a cell membrane that is capable of recognizing and binding with a specific hormone.

target cell: cell acted upon by a specific hormone.

testes: male sex organs that secrete the hormone testosterone.

testosterone: hormone secreted by the testes.

thymus: endocrine gland located in the chest above the lungs.

thyroid: endocrine gland located in the neck.

thyroid stimulating hormone (TSH): hormone secreted by the pituitary that acts on the thyroid.

thyroxine: hormone secreted by the thyroid that affects metabolism.

BIBLIOGRAPHY

Beck, William; Karel, Liem; and Simpson, George. *Life: An Introduction to Biology*. New York: Harper Collins, 1991.

Bernard, Christian. *The Body Machine*. New York: Crown Publishers, 1981.

Bernstein, Leonard. *Globe Biology*. Englewood Cliffs, N. J.: Globe Book Company, 1990.

Casselli, Giovanni. *The Human Body and How It Works*. New York: Grosset & Dunlap, 1987.

Elting, Mary, *The Macmillan Book of the Human Body*. New York: Macmillan Publishing Co., 1986.

Ferl, Robert J. and Wallace, Robert A. *Biology: The Realm of Life*. New York: Harper Collins, 1996.

Miller, Kenneth and Levine, Joseph. *Biology*. Englewood Cliffs, N.J.: Prentice Hal, 1998.

The Nervous System. Circuits of Communication. New York: Torstar Books, 1985.

RELATED VIDEOS FROM RAINBOW

The Body's Defenses Against Disease

Cell Division

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In Control: Our Brain and Nervous System

Introducing the Cell

Our Flexible Frame: The Skeletal and Muscular Systems

Pumping Life: The Heart and Circulatory System

**APPENDIX:
MAJOR ENDOCRINE GLANDS
AND THEIR HORMONES**

gland(s)	hormone(s)	function of hormone(s)
adrenals	epinephrine, norepinephrine	increase heart rate and blood pressure, direct blood to muscles and brain
ovaries	estrogen	produces female secondary sex characteristics
pancreas	insulin	regulates glucose levels
pituitary	growth hormone	stimulates growth
	TSH (thyroid stimulating hormone)	stimulates thyroid to release thyroxine
	oxytocin	stimulates release of milk
	prolactin	promotes milk production
parathyroids	parathyroid hormone	regulates calcium use by body
testes	testosterone	produces male secondary sex characteristics
thyroid	thyroxine	regulates metabolism and growth

SCRIPT

Female Narrator:

How do our bodies react to stress or danger?

How do our bodies help protect us from cold or heat?

Why do we grow and why do we stop growing? What

kinds of changes occur during puberty?

Answers to these and many other questions lie in hormones and the endocrine system.

Title: The Endocrine System: Regulating the Body's Chemistry

Male Narrator:

A city is a complex community. Millions of people perform thousands of different kinds of jobs. Streets and highways provide transportation networks enabling people and products to get from one place to another. These activities and many others need to be coordinated and regulated in order for a city to function smoothly. Traffic lights, for example, help insure the smooth flow of vehicles and pedestrians by signaling them when to go...

and when to stop. Imagine the gridlock that would result if traffic lights were to fail, or if each light wasn't synchronized to work with other lights.

Female Narrator:

The human body is far more complex than any city. It is made up of many different organs and trillions of cells whose activities also need to be carefully regulated in order for it to function.

The body has two main systems for coordinating and regulating its activities. One is the nervous system, which consists of the brain, spinal cord, and a network of nerves that branch throughout the body.

The other system is the endocrine system. The endocrine system consists of different endocrine glands. These glands produce chemicals called hormones that the body needs.

Endocrine glands secrete—or release—their hormones into the vast network of blood vessels that make up the circulatory system. Carried along in the blood, hormones are chemical messengers that reach cells throughout the body.

Male Narrator:

Each kind of hormone acts only on specific kinds of target cells. A target cell has a receptor on its surface. A receptor is a place where a hormone can latch onto the target cell. Hormones and receptors fit together like pieces of a jigsaw puzzle. A specific hormone will attach only to the receptor sites of a specific kind of cell. When a hormone reaches a target cell, it causes the cell to respond. For example, a hormone may signal the cell to produce certain chemicals the body needs. Hormones may also signal cells to stop producing certain chemicals.

One example of how hormones work is provided by the parathyroid glands. These four small glands are embedded in a larger endocrine gland called the thyroid. The parathyroid glands secrete a hormone called parathyroid hormone. The target cells for this hormone are in the bones. When it reaches its target cells, the hormone causes these bone cells to release calcium into the blood. The body needs a certain amount of calcium.

Female Narrator:

The endocrine system works more slowly than the nervous system which also regulates the activities of our bodies. For example, if you touch a hot iron, the nervous system senses the heat almost instantaneously and sends signals to muscles that make you pull your hand back.

In other situations, the nervous system works closely with the endocrine system in ways that are slower but more long lasting than the nervous system responding by itself. Imagine you are walking down a dark alley. You feel alone, vulnerable, and scared. Through your sense of sight and other senses, the nervous system detects what may be a dangerous situation and signals the endocrine system to respond.

In response to these signals, your adrenal glands—located on top of your kidneys—secrete two hormones: epinephrine, also known as adrenalin, and norepinephrine. These hormones have several different effects on your body.

They cause your heart to beat faster and blood pressure to increase; and they direct blood to muscles and the brain. All these responses prepare you to fight or run away. In fact, together they are called the "fight or flight response."

The fight or flight response has helped soldiers to perform and survive in combat even when they have gone without sleep for days and were otherwise near exhaustion.

Male Narrator:

But even in situations that aren't dangerous, the same hormones may be at work. A student giving a piano recital is an example. Sitting down at the keyboard, she feels nervous about performing in front of an audience. Her heart

beats faster. Her blood pressure rises. These and other responses result from the actions of epinephrine and other hormones and make her more alert and better able to perform.

Normally, hormones do their job and then are quickly broken down into simpler elements. The body maintains a delicate internal balance. If epinephrine and other hormones remained at higher than normal levels in the student's blood after her recital, they could cause harm.

The proper functioning of endocrine glands and the hormones they secrete are vital to our health. This is Dr. David Bloomgarden, an endocrinologist. An endocrinologist is a doctor who specializes in hormones and endocrine glands.

Dr. Bloomgarden:

If there is too much production or too little production of a particular hormone, one can see changes in the body that are off the normal path. If there is too much, that can be a problem. If there is too little, that can be a problem. The endocrine system is a fascinating system, one that is constantly run by checks and balances.

Female Narrator:

The body has ways of detecting how much of a hormone is in the blood and then directing the appropriate endocrine glands to turn on or off as needed.

A thermostat in a house illustrates how this system works. A thermostat monitors the inside temperature of a house and signals a furnace to turn on or off in order to keep the temperature close to a desired level. Suppose the thermostat is set at 68 degrees Fahrenheit, which is about 20 degrees Celsius.

If the temperature falls below 68 degrees, the thermostat senses this. It then signals the furnace to turn on. The heat from the furnace causes the temperature to rise. When the temperature reaches 68 degrees again, the thermostat senses this. It then signals the furnace to turn off.

Male Narrator:

Like a house, we, too, have a kind of thermostat that helps us maintain a fairly constant temperature inside our bodies, even when the temperature outside changes. Imagine you are waiting to be picked up by a school bus on a cold winter day. It helps if you are dressed warmly, but your body also has ways of helping you cope with the cold.

A part of the brain called the hypothalamus plays the role of the body's thermostat. The hypothalamus monitors the temperature inside the body and helps keep it around 98.6 degrees Fahrenheit or 37 degrees Celsius. If the temperature drops below this level, the hypothalamus signals a nearby endocrine gland, the pituitary.

In response to these signals from the hypothalamus, the pituitary releases a hormone that acts upon the thyroid, an endocrine gland located in the lower neck. This hormone is called TSH, or thyroid stimulating hormone. When stimulated by TSH, the thyroid in turn releases another hormone, thyroxine.

Thyroxine causes cells throughout the body to release more heat, just as the furnace in a house turns on to release more heat. As a result, the body's internal temperature rises.

Female Narrator:

The actions of the hypothalamus illustrate once again how closely the endocrine and nervous systems work together.

This pea-sized part of the brain constantly checks conditions inside the body. In addition to temperature, it monitors blood pressure, the amount of water and salt in our blood, and many other things.

Dr. Bloomgarden:

The hypothalamus is a rather unique organ in the human body. It helps to check conditions within the body and at the same time direct hormones to target tissues, in some instances helping to start and in other instances helping to stop certain conditions that need to be regulated within the human body.

Female Narrator:

While it is part of the brain, the hypothalamus also acts like an endocrine gland by releasing hormones that affect the ways other endocrine glands do their jobs. These hormones move to the nearby pituitary gland. The pituitary secretes many different kinds of hormones. Some signal other endocrine glands to secrete their own hormones.

Dr. Bloomgarden:

The pituitary gland is a remarkable gland, often referred to as the master gland. It tells other endocrine organs when to turn on and when to turn off, and the pituitary gland has the role of regulating a whole host of other hormones in the body.

Female Narrator:

In this way, the endocrine system is like a smoothly coordinated orchestra. The pituitary is the conductor of this orchestra, and other endocrine glands are different musicians that the conductor signals when to play and when not to play.

Male Narrator:

Besides regulating the actions of other endocrine glands, the pituitary secretes growth hormone, which targets cells in the bones, muscles and other places in the body. This hormone regulates growth throughout childhood. In early adolescence the pituitary increases the amount of growth hormone it secretes, and growth can be particularly rapid; but when most people are about 16 to 18 years old, they stop growing because their bones and other tissues stop responding to growth hormone.

Sometimes, the pituitary doesn't produce the right amount of growth hormone. The consequences can be dramatic. In the 1800s, a person nicknamed Tom Thumb was unusually short because his pituitary produced too little growth hormone. When he was eleven, he was only 25 inches or 64 centimeters tall.

A century later, Robert Wadlow grew to a height of almost nine feet or about 270 centimeters because his pituitary produced too much growth hormone. Here he towers over his normal sized father.

Examples like Tom Thumb and Robert Wadlow, however, are rare. People with normal amounts of growth hormone grow to be many different sizes.

While hormones regulate growth, diet and other factors also affect how tall or short a person will be.

Female Narrator:

Size isn't the only change that occurs as a child grows into an adult. Look at a series of photographs of the same person taken over a number of years.

As she went through childhood, she grew bigger; but the differences between an eight year old and the same person when she was 13 become noticeable for other reasons as well. These changes differ for boys and girls.

For girls, endocrine glands called the ovaries control the onset of puberty, the time when a person becomes sexually mature. The ovaries produce a hormone called estrogen. As estrogen levels increase during puberty, girls develop breasts, body hair, as well as fat around their hips and other parts of their bodies.

Male Narrator:

In boys, endocrine glands called testes produce another kind of hormone, testosterone. Testosterone causes their voices to become deeper and their muscles to become bigger. They also grow facial hair and hair on other parts of their bodies.

For both males and females, certain hormones prepare their bodies for parenthood. Sperm cells develop in the testes. Menstruation begins. A female's menstrual cycle, in which the ovaries release eggs, is also controlled by the actions of different hormones.

Female Narrator:

Although the effects of hormones during puberty are dramatic, hormones play important roles throughout the human life span. A hormone called oxytocin causes contractions of the uterus during labor.

After a child is born, oxytocin and another hormone called prolactin cause the breasts to produce milk.

Somewhere between the ages of 45 and 55 other hormonal changes occur in women. Their ovaries produce less estro-

gen and stop releasing eggs. This is called menopause. At this stage in their lives, they can no longer conceive children.

As men get older, the levels of testosterone decline. Among other effects, they lose some muscle tone.

As people continue to age, still other hormonal changes occur, and scientists are researching the effects of hormones on the aging process.

Male Narrator:

Endocrine glands and their hormones do many other things. The thymus, for example, helps our bodies fight bacteria and viruses that cause disease.

The pancreas plays other important roles in maintaining our health. Embedded inside the pancreas are endocrine cells that secrete the hormone insulin. Insulin helps regulate the amount of a certain kind of sugar in our blood. This sugar is called glucose. Glucose is the body's fuel. It provides the energy for cells to function, as gasoline provides the fuel and energy for a car.

Just as with other substances in the body, the amount of glucose in the bloodstream has to be kept within narrow limits in order for us to function well.

Drinking an ice cream milkshake, for example, will slightly raise the levels of glucose in our blood. When there is too much glucose in the blood, the pancreas responds by producing more insulin. Insulin removes excess glucose and stores it in the liver.

Female Narrator:

For most of us, this finely tuned system helps maintain just the right levels of glucose, but for some people the pancreas doesn't function properly.

Peter:

My name is Peter. I have diabetes. Diabetes is a disease of the endocrine system. It's caused when the pancreas doesn't produce insulin.

Female Narrator:

Peter has to carefully keep track of what he eats and how much he exercises because both these things affect how much glucose is in his blood.

If Peter's diabetes were left untreated, excess glucose would lead to serious health problems.

Peter:

To take care of myself I need to take blood tests. When I take a blood test, I'm measuring the amount of glucose in my blood.

Female Narrator:

Based on the levels of glucose, Peter gives himself injections of insulin.

Peter:

Taking insulin is a way of keeping my blood glucose levels regulated. The more insulin you take the lower your sugar will be, because insulin lowers your blood glucose levels. I want to take the right amount so its not too high or too low.

Female Narrator:

Developments in the treatment of diabetes have given hope to people like Peter that they can lead normal lives.

Male Narrator:

We are learning more about other problems with the endocrine system as well. For example, scientists are researching the effects of hormones on human emotions, particularly depression. What makes people anxious or sad? These are questions that have often been the focus of art, and more and more they are also the focus of medicine.

Dr. Bloomgarden:

We are daily learning more about how the endocrine system may affect our moods...how our day-to-day living may be affected by hormonal changes, and as we better understand those hormonal changes, we can hope to improve the lives of those individuals who may be depressed or who may have problems with mood swings. Hopefully, we'll be able to address those issues in the future.

Female Narrator:

Our endocrine glands and the hormones they produce maintain a delicate chemical balance...a balance that is essential to our health and survival.

Male Narrator:

Hormones play many different roles that affect the entire body.

They help keep our internal temperatures stable.

They help us respond to danger, and perform well under stress.

Female Narrator:

Hormones control how we grow,

and how we change from boys and girls into men and women.

Male Narrator:

These chemical messengers ensure that our blood contains the right amounts of the glucose fuel our cells need to function.

Female Narrator:

As we learn more about the human endocrine system, scientists hope to develop new and better treatments for a variety of diseases.

and to better understand the emotions and feelings that are part of being human.

End