The Endocrine System

Guide to Reading

Building Vocabulary
The ancient Greek word *metabolē* means “change.” Look up the meaning of the word *metabolism*. Explain what you think the word *metabolism* has to do with change.
- hormones (p. 370)
- endocrine system (p. 370)
- metabolism (p. 371)

Focusing on the Main Ideas
In this lesson, you will learn to
- describe how the endocrine system affects growth and development.
- identify two disorders of the endocrine system and how to treat them.
- find information about managing diabetes.

Reading Strategy
Analyzing a Graphic Use the diagram shown here to create a concept map about the endocrine system. Fill in the map as you read the lesson.

Quick Write
Write down three things you know about hormones. Revisit this list after you have read the lesson.

Parts of the Endocrine System

Hormones are one of the things that make your body change during puberty. **Hormones** are *chemical substances produced in certain glands that help to regulate the way your body functions*. They are produced by the organs of the endocrine system. The **endocrine system** is the system of glands throughout the body that regulate body functions. **Figure 12.2** shows the parts of the endocrine system.

Glands and Hormones

Each gland of the endocrine system makes one or more specific hormones. Hormones act like chemical signals that tell your organs and tissues what to do. For example, the pancreas makes the hormones insulin and glucagon. When the pancreas releases insulin into the blood, it lowers the level of sugar in the blood. When the pancreas releases glucagon, it raises the blood sugar level. If blood sugar is too low, you feel weak and lightheaded. If it’s too high, you can feel nauseated.

Reading Check Identify What are two hormones produced by the pancreas?
The endocrine system controls many of the changes that happen during puberty. **What does the pituitary gland do?**

**Pituitary gland**
- The pituitary gland at the base of the brain produces several hormones that control the work of other glands and organs, such as the thyroid gland, adrenal glands, and kidneys. Pituitary gland hormones also regulate the body’s growth and development.

**Parathyroid glands**
- The parathyroid (par-uh-THY-royd) glands are located within the thyroid gland. They regulate the levels of calcium and phosphorous in the blood.

**Adrenal gland**
- The adrenal (uh-DREE-nuhl) glands produce hormones that help regulate the balance of salt and water in the body. The adrenal glands also aid in digestion and control the body’s response to emergencies and excitement. They are located on top of the kidneys.

**Ovaries (in female)**
- Ovaries (OH-vuh-reez) are the female reproductive glands. Hormones produced in the ovaries control sexual development and the maturing of eggs.

**Thyroid gland**
- The hormone produced by the thyroid gland regulates body growth and the rate of **metabolism**, the process by which the body gets energy from food. The thyroid is located alongside the trachea, or windpipe.

**Pancreas**
- The pancreas, located behind the stomach, controls the level of sugar in the blood and provides the small intestine with digestive chemicals called enzymes.

**Testes (in male)**
- The testes (TES-teez) are the male reproductive glands. The hormone produced in the testes controls sexual development and the production of sperm.

One major role of the endocrine system is to control the body’s metabolism. **Metabolism** is the process by which the body gets energy from food. It is regulated by hormones made by the thyroid gland.

**Diseases of the Endocrine System**

Remember, some organs are controlled by endocrine glands. These organs can’t do their job unless they receive the hormones they need. If there are problems with one or more glands in the endocrine system, these organs don’t function properly. Diseases of the endocrine system can develop when either too much or too little of a hormone is produced.
**Health Skills Activity**

**Advocacy**

**Managing Diabetes**
People with diabetes must carefully keep track of the types and amounts of foods they eat. If they eat foods with too much sugar, they can become ill. If they don’t eat enough food, or wait too long to eat, their blood sugar levels can become dangerously low.

**On Your Own**
Go to the library or search the Internet for valid information about diabetes. Create a brochure that encourages teens who have diabetes to manage their condition carefully. Be sure to include information that explains why managing diabetes is so important.

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**Diabetes**

Diabetes is an endocrine disorder. It occurs when the body doesn’t produce enough of the hormone called insulin or doesn’t respond properly to the insulin that is produced. Insulin lowers the amount of sugar in the blood. People with diabetes have too much sugar in their blood. There are two types of diabetes: type 1 and type 2.

Some people are born with type 1 diabetes. In type 1 diabetes, germ-fighting cells in the body attack the cells of the pancreas that produce insulin. The body doesn’t produce enough insulin, and there is too much sugar in the blood. If not treated, a person with type 1 diabetes can fall into a coma. People with type 1 diabetes must regularly inject themselves with insulin to keep their blood sugar at the right level.

People with type 2 diabetes produce a normal amount of insulin, but their bodies can’t use it well. This kind of diabetes often develops in adulthood, but people of all ages, including children, can develop it. It’s more common in people who are overweight. People with this disorder may feel tired a lot and often sick to their stomachs. They may

This teen, like others with type 1 diabetes, has learned to monitor her blood sugar and give herself insulin injections. **Why do people with diabetes have to be careful of what they eat?**
also have infections and wounds that do not heal. People with type 2 diabetes have to carefully control their diets and engage in regular physical activity. They also sometimes need medication.

If diabetes is not managed well, there can be long-term harmful effects. People may suffer from poor circulation, nerve damage, heart disease, kidney failure, or blindness. Poor circulation and nerve damage can result in the need to amputate, or remove through surgery, a body part such as a toe, a foot, or leg.

Thyroid Diseases

Metabolism can be affected by diseases of the thyroid gland. If the gland doesn’t make enough hormones to regulate metabolism, a person can develop a condition called hypothyroidism. A person with hypothyroidism may feel tired and cold, have dry skin, and gain extra weight. In teens, hypothyroidism can also delay growth. Fortunately, hypothyroidism can be treated with a thyroid replacement hormone.

Hyperthyroidism is the opposite of hypothyroidism. In hyperthyroidism, the thyroid produces too many hormones. This leads to a very high metabolism. A high metabolism can lead to sweating, excessive eating, weight loss, tremors, and muscle weakness. Hyperthyroidism can be treated with medication.

Reading Check Explain What is hyperthyroidism?

Lesson 2 Review

After You Read

Review this lesson for new terms, major headings, and Reading Checks.

What I Learned

1. Vocabulary What is metabolism?

2. List What are three functions of the hormones produced by the thyroid gland?

3. Explain How are type 1 and type 2 diabetes usually treated?

4. Explain How is hypothyroidism treated?

Thinking Critically

5. Infer Why might a disease that affects an endocrine gland have effects on other parts of the body?

6. Apply Some drugs are synthetic, or artificial, hormones. Why is it necessary to consult a doctor before taking this kind of medication to treat a disease?

Applying Health Skills

7. Communication Skills Imagine that your friend has diabetes. You notice that your friend is not managing the condition properly. What advice would you give him or her?