

Adolescence—A Time of Change

BUILDING VOCABULARY

endocrine system
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hormones (p. 16)
puberty (p. 16)
pituitary gland (p. 17)

GUIDE TO READING

FOCUSING ON THE MAIN IDEAS

In this lesson, you will learn how to:

- Identify the causes of the physical changes that occur during adolescence.
- Explain the role of hormones during puberty.
- Relate the development of secondary sex characteristics to chemical changes that occur within the body.

READING STRATEGY

EXPLAIN

Write a paragraph describing why adolescence is a time of change. What types of physical, mental/emotional, and social changes do adolescents experience?

QuickWrite Suppose you have a younger sister or brother aged 10 or 11 who is the same gender as you. If your sister or brother asked you what changes they should expect to go through during the next few years, what would you say? Write your answer, and be as specific as possible. Include emotional as well as physical changes.

The body is remarkably complex, with organ systems working together to create and regulate growth, change, flexibility, and stability. The nervous system is the primary regulating system of the body; it works closely with the endocrine system to regulate a variety of body functions.

The **endocrine system** is a body system made up of glands that release chemicals called hormones into the blood. **Hormones** are substances that regulate the activities of different body cells and organs. Hormones control the changes that occur during puberty.

Puberty

During adolescence, hormones signal your body to make developmental changes. Puberty is the period of growth from physical childhood to physical adulthood when a person begins to develop certain adult traits of his or her own gender. Puberty is marked by periods of rapid, uneven physical growth, and all individuals, starting as early as nine years of age, go through it at their own pace, a pace that is right for their body. Changes during puberty occur at different times for each individual. The variation in sizes and shapes among people the same age is entirely normal.

Hormones and the Pituitary Gland

Hormones act as chemical stimulators that regulate body functions in three ways:

- ▶ Hormones stimulate parts of the body to provoke certain reactions, such as the rush of adrenaline you get in an emergency situation. Your heart races; your mouth gets dry; your palms sweat. You cannot control the secretion of a hormone or your body's reaction to it. Keep this in mind as you learn about other hormonal effects.
- ▶ During growth periods, hormones produce structural changes in the body, including bone development, maturation of reproductive organs, and development of secondary sex characteristics.
- ▶ Hormones regulate the rate of metabolism, the rate at which body cells produce energy.

The hormones responsible for changes in your body during puberty are released by the pituitary gland. The **pituitary gland** is *the gland that controls much of the endocrine system*. It is about the size of a pea and is located at the base of the brain. An area of the brain called the hypothalamus stimulates the pituitary to release the necessary hormones. Besides growth hormones, the pituitary gland releases hormones that affect the brain, glands, skin, bones, muscles, and reproductive organs. It also secretes two hormones that are responsible for stimulating maturation of the reproductive organs that produce sex cells. These are the testes in the male and the ovaries in the female. The two hormones are LH (luteinizing hormone) and FSH (follicle-stimulating hormone).

- ▶ In the male, LH controls the amount of the hormone testosterone produced by the testes, and FSH controls sperm production.
- ▶ In the female, FSH and LH control the levels of the hormones estrogen and progesterone produced by the ovaries; FSH also causes maturation of ova, or eggs, and LH stimulates ovulation, or release of a mature ovum.



During puberty, individuals experience growth spurts and other physical changes at different ages and different rates. *What triggers these changes during adolescence?*





A Good hygiene can help to control acne. Medication may be required in cases of severe acne. *Why do you need to pay more attention to personal hygiene during puberty?*

Secondary Sex Characteristics

During puberty, at each individual's own pace, the reproductive organs mature and begin to release the hormones that cause the development of secondary sex characteristics. In males, testosterone causes facial, underarm, and pubic hair to grow, and shoulders to broaden. The voice deepens and muscles develop. The bones become longer and larger. In females, estrogen and progesterone cause growth of underarm and pubic hair, and widening of hips. Soon after the growth of pubic hair, the breasts begin to develop in response to hormonal changes in the body.

Along with development of the secondary sex characteristics comes increased activity of the oil and sweat glands. This is why acne becomes a problem during adolescence. Increased sweat and underarm hair can also cause body odour. Good hygiene is especially important during this time and will help minimize these problems.

Changes of Puberty

Each person's timeline for puberty is different. Girls generally enter puberty between 9 and 14 years of age, while the onset for boys ranges from age 10 to 16. There is no other time in life when there is such a wide variation in sizes and shapes of people who are the same age. This variation can cause concern for some teens.

Breast maturity can occur very slowly or, for some girls, almost overnight. Heredity plays a key role in this development. Growth spurts during puberty depend largely on each person's genetic inheritance and are set in motion by hormones. These hormonal changes cause feelings and sensations never experienced before. Remember that everyone grows at a rate that is just right for him or her.

Lesson 3 Review

Reviewing Facts and Vocabulary

1. What is the endocrine system?
2. What role do hormones play during puberty?
3. Name the organs responsible for releasing the hormones that cause the development of secondary sex characteristics.

Thinking Critically

4. Evaluate the significance of physical changes that occur during adolescence. How might the development of secondary sex characteristics affect an adolescent's social and emotional development?

5. Compare the secondary sex characteristics that develop during puberty for females with those that develop for males.

Applying Health Skills

Common stressors for teens are worries about height, weight, or appearance. Make a poster that focuses on how each individual is unique. On the poster, provide a positive tip for handling these stressors, such as thinking positively or being physically active.