What is a hormone?

This messenger pigeon is delivering a letter, making sure it gets to where it needs to go. It could be said that hormones are biological messengers, and they originate from the endocrine system. In addition to the nervous system, the endocrine system relays messages throughout the body via chemical messenger molecules released by glands into the bloodstream. These molecules, called hormones, act slowly compared to the rapid transmission of electrical messages by the nervous system. They must travel through the bloodstream to the cells they affect, and this takes time. On the other hand, because endocrine hormones are released into the bloodstream, they travel throughout the body. As a result, endocrine hormones can affect many cells and have body-wide effects.

Function of the Endocrine System

The endocrine system is a system of organs that releases chemical messenger molecules, called hormones, into the blood. Unlike the nervous system, whose actions help the body react immediately to change, the endocrine system controls changes that happen to the body over long periods of time, which can be minutes, hours, or even years. The two systems work closely together to help us respond to our environment, such as during a rollercoaster ride like in Figure 1.1. The endocrine system is important in controlling metabolism, growth and development, reproduction, and salt, water, and nutrient balance in blood and other tissues (osmoregulation).
What an adrenaline rush! The excitement that the people on this roller-coaster are feeling is a good example of how the nervous and endocrine systems work together. Nerve impulses from the sympathetic nervous system cause the adrenal medulla to release the hormone adrenaline into the bloodstream. Adrenaline causes the racing heart, sweaty palms, and feeling of alertness that together are called the "fight or flight" response.

The nervous system uses nerves to conduct electrical and chemical information around the body, while the endocrine system uses blood vessels to carry chemical information. You can think of the nervous system as being similar to the electrical system in a house. Flicking on a light switch is similar to initiating an action potential in a nerve, and it has an almost immediate result: the light bulb illuminates. The endocrine system, on the other hand, is more like starting up an oil or gas powered water-heating system. You flick on the switch to heat up water for a bath, but it takes a certain length of time for the result - hot water - to occur.

**Organs of the Endocrine System**

The endocrine system is made up of many glands that are located in different areas of the body. **Hormones** are chemical messenger molecules that are made by cells in one part of the body and cause changes in cells in another part of the body. Hormones regulate the many and varied functions that keep you alive.

Hormones are made and secreted by cells in endocrine glands. **Endocrine glands** are ductless organs that secrete hormones directly into the blood or the fluid surrounding a cell rather than through a duct. The primary function of an endocrine gland is to make and secrete hormones. The endocrine glands collectively make up the endocrine system. The major glands of the endocrine system are shown in **Figure 1.2**. Many other organs, such as the stomach, heart, and kidneys, secrete hormones and are considered to be part of the endocrine system.
The glands of the endocrine system are the same in males and females, except for the testes, which are found only in males, and the ovaries, which are found only in females.

**Exocrine glands** are organs that secrete their products into ducts (they are duct glands). They are similar to endocrine glands in that they secrete substances, but they do not secrete hormones. Instead, they secrete products such as water, mucus, enzymes, and other proteins through ducts to specific locations inside and outside the body. For example, sweat glands secrete sweat onto the skin, and salivary glands secrete saliva into the mouth. Some endocrine glands, such as the pancreas, are also exocrine glands. Ducts in the pancreas secrete fat-digesting enzymes into the intestines. The secretion of the enzymes from the pancreas is controlled by hormones that are made by certain stomach cells.

**Summary**

- The endocrine system is an organ system made up of endocrine glands that release hormones into the bloodstream.
• The endocrine system releases signals over a period of minutes, hours, or years; it works in conjunction with the more rapid nervous system to pass messages through the body.

Review

1. How are the endocrine and nervous systems similar? How are they different?
2. What are hormones?
3. What are the organs of the endocrine system?

References