

## The Endocrine System

### *Systems of the Human Body*

The human body is equipped with many systems, which promote its long-term health and wellbeing. Perhaps you have learned that the most basic unit of life is the cell, and that the human body is composed of millions of cells of many different types. A group of cells, working together to perform a specific function, is called a tissue. A group of tissues, working together to perform a group of functions, is called an organ, and a group of organs, working together, makes up a system. The Endocrine System is one of these. Like the Circulatory, Respiratory, Skeletal, and Digestive Systems, it functions in unique ways to support life.

The Endocrine System is made up of a system of glands, which secrete proteins called hormones into the body. These glands are found all over the human body: in the brain, the throat, organs of the digestive system (the pancreas, liver, kidneys), and the sex organs. The glands each work to secrete, or synthesize and then release into the bloodstream, their own hormone or set of hormones. Hormones are special proteins, which act as signals. They bind to certain proteins on cells called receptor proteins, located on target tissues. The target tissues await the message to tell them what to do. The hormone then "tells" the cells in that tissue to do a certain thing, at a certain time.

For example, the pancreas makes and secretes a hormone called insulin. Insulin binds to receptors on the cell membrane, which allows free glucose from the bloodstream to enter the cell. The free glucose is made from food we have eaten that has been broken down. The glucose can then be broken down and used for energy in the cell.

Another example is the pituitary gland, found near the lower part of the brain. The pituitary gland makes several hormones, including one called human growth hormone (HGH). HGH binds to receptors on muscle cells to signal the cell to grow, reproduce, or repair themselves.

Many, many more hormones are made to signal the body to perform a certain function. What do you think would happen without hormones to regulate these functions? The body would not know when or how much of certain activities to do.

Without insulin, for example, the person has no signal for the cells to "open the gate" to let glucose in. Glucose then builds up in the bloodstream, damaging tissues and starving the cells. This condition is called diabetes. Without HGH, the body does not know when to grow or how much growing to do. You can see that the regulation of activities within the body is essential to life. Without it, the body is like a lawless city, and the body cannot spare fuel for such unregulated activity on the part of its cells.

The Endocrine System can be compared to the Nervous System in that it is an informational signal system via chemicals and cells. The Nervous system sends information quickly, which usually results in responses that are very short in