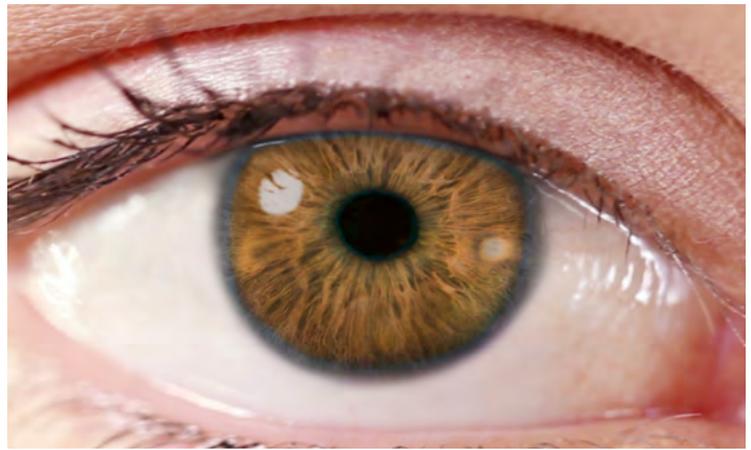


The Nervous System

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12.1 Organization of the Human Body

You look at the traffic light and step off the curb. As you cross the street, you consider whether you want tacos or a sandwich for lunch. You breathe in, bringing oxygen into your body, and then breathe out, removing carbon dioxide. Blood, pumped by your heart, moves through your blood vessels. At the same time, immune cells crowd around a small cut on your finger, dispatching the invading bacteria. At any moment, your body is involved in a huge number of different activities. To do their jobs, the cells in your body are organized into tissues, organs, and organ systems (Figure 12.1).

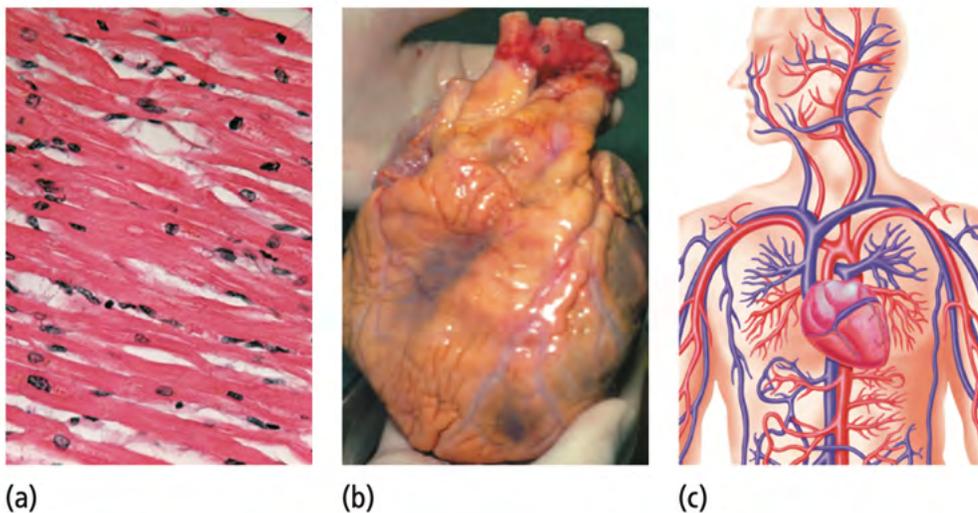


FIGURE 12.1

In the human body, cells are organized into tissues, organs, and organ systems. (a) Many muscle cells make up muscle tissue. This photo shows muscle tissue from a human heart. (b) The heart is an organ. (This heart has just been removed from a donor and will soon be transplanted into a recipient.) (c) The circulatory system is made up of the heart, blood, and blood vessels. The circulatory system transports nutrients, gases, and wastes to different parts of the body.

A **tissue** is a group of similar cells that performs a certain function. There are four main types of tissue in the body.

- *Epithelial tissue* consists of sheets of tightly packed cells that cover the internal and external surfaces of the body. Skin is an example of epithelial tissue.



- *Connective tissue* consists of cells scattered within an external matrix. Bone, cartilage, and blood are all connective tissues.
- *Muscle tissue* is made up of cells that are able to contract, or shorten. Three types of muscle tissue are found in the body. Skeletal muscle is responsible for voluntary movements. Smooth muscle functions in the internal organs of the digestive system as well as in certain blood vessels. Cardiac muscle is found in the heart and produces the heartbeat.
- *Nervous tissue* transmits information from one place in the body to another. Nervous tissue is found in the brain, spinal cord, and nerves.

Multiple tissues combine to make an **organ**, a structure in the body that has a specific function. The heart, stomach, and brain are examples of organs. Each of these organs is made up of multiple tissues. For example, the heart (1) is surrounded by epithelial tissue on the outside and lined with it on the inside; (2) contains blood vessels carrying blood, a connective tissue; (3) has walls made up largely of cardiac muscle; and (4) contains nerves, made of nervous tissue, that help to control its activity.

An **organ system** is a set of organs that work together to perform a particular bodily function. For example, the circulatory system moves nutrients, gases, and wastes throughout the body. The human body has ten major organ systems: nervous, sensory, endocrine, reproductive, muscular and skeletal, circulatory, respiratory, digestive, excretory, and immune. In the next chapters, we'll look at what these organ systems do.

READING CHECK

You are at the gym lifting weights. You flex your arm, using your biceps muscle to lift a barbell. Is muscle tissue involved in this action? Are the other types of tissues (epithelial, connective, and nervous tissues) involved in this action?

CHECK YOUR ANSWER

Muscle tissue is definitely involved. Your biceps muscle is made up largely of skeletal muscle cells that are able to contract. The muscle itself is surrounded by epithelial tissue. Blood, which is a connective tissue, supplies the muscle with the oxygen it needs to contract. In addition, muscle contraction is able to make your arm bend and lift the weight because the muscle is attached to bones, another connective tissue, in your arm. Finally, nerves, made of nervous tissue, direct the contraction of the biceps muscle as you lift the barbell.

To learn more about how cells are organized into tissues, organs, and organ systems, go to this website:

<https://www.bbc.co.uk/bitesize/guides/z9hyvcw/revision/6>

