Human Body

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Learning Objectives

- List the levels of organization in the human body.
- Define cell, tissue, organ, and organ system.
- Identify the four types of tissues that make up the body.
- Give examples of organ systems and their functions.

Do cells work together?

Cells, like these nerve cells, do not work in isolation. To send orders from your brain to your legs, for example, signals pass through many nerve cells. These cells work together to perform a similar function. Just as muscle cells work together, bone cells and many other cells do as well. A group of similar cells that work together is known as a tissue.
**Organization of Your Body: Cells, Tissues, Organs**

Cells are grouped together to carry out specific functions. A group of cells that work together form a **tissue**. Your body has four main types of tissues, as do the bodies of other animals. These tissues make up all structures and contents of your body. An example of each tissue type is pictured in the **Figure 1.1**.

1. **Epithelial tissue** is made up of layers of tightly packed cells that line the surfaces of the body. Examples of epithelial tissue include the skin, the lining of the mouth and nose, and the lining of the digestive system.
2. **Connective tissue** is made up of many different types of cells that are all involved in supporting and binding other tissues of the body. Examples include tendon, cartilage, and bone. Blood is also classified as a specialized connective tissue.
3. **Muscle tissue** is made up of bands of cells that contract and allow movement.
4. **Nervous tissue** is made up of nerve cells that sense stimuli and transmit signals. Nervous tissue is found in nerves, the spinal cord, and the brain.

**FIGURE 1.1**

Your body has four main types of tissue: nervous tissue, epithelial tissue, connective tissue, and muscle tissue. They are found throughout your body.
Groups of Tissues Form Organs

A single tissue alone cannot do all the jobs that are needed to keep you alive and healthy. Two or more tissues working together can do a lot more. An organ is a structure made of two or more tissues that work together. The heart (Figure 1.2) is made up of the four types of tissues.

Groups of Organs Form Organ Systems

Your heart pumps blood around your body. But how does your heart get blood to and from every cell in your body? Your heart is connected to blood vessels such as veins and arteries. Organs that work together form an organ system. Together, your heart, blood, and blood vessels form your cardiovascular system.

What other organ systems can you think of?

Organ Systems Work Together

Your body’s 12 organ systems are shown below (Table 1.1). Your organ systems do not work alone in your body. They must all be able to work together.

For example, one of the most important functions of organ systems is to provide cells with oxygen and nutrients and to remove toxic waste products such as carbon dioxide. A number of organ systems, including the cardiovascular and respiratory systems, all work together to do this.

<table>
<thead>
<tr>
<th>Organ System</th>
<th>Major Tissues and Organs</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular</td>
<td>Heart; blood vessels; blood</td>
<td>Transports oxygen, hormones, and nutrients to the body cells. Moves wastes and carbon dioxide away from cells.</td>
</tr>
<tr>
<td>Lymphatic</td>
<td>Lymph nodes; lymph vessels</td>
<td>Defend against infection and disease, moves lymph between tissues and the blood stream.</td>
</tr>
</tbody>
</table>
TABLE 1.1: (continued)

<table>
<thead>
<tr>
<th>Organ System</th>
<th>Major Tissues and Organs</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digestive</td>
<td>Esophagus; stomach; small intestine; large intestine</td>
<td>Digests foods and absorbs nutrients, minerals, vitamins, and water.</td>
</tr>
<tr>
<td>Endocrine</td>
<td>Pituitary gland, hypothalamus; adrenal glands; ovaries; testes</td>
<td>Produces hormones that communicate between cells.</td>
</tr>
<tr>
<td>Integumentary</td>
<td>Skin, hair, nails</td>
<td>Provides protection from injury and water loss, physical defense against infection by microorganisms, and temperature control.</td>
</tr>
<tr>
<td>Muscular</td>
<td>Cardiac (heart) muscle; skeletal muscle; smooth muscle; tendons</td>
<td>Involved in movement and heat production.</td>
</tr>
<tr>
<td>Nervous</td>
<td>Brain, spinal cord; nerves</td>
<td>Collects, transfers, and processes information.</td>
</tr>
<tr>
<td>Reproductive</td>
<td>Female: uterus; vagina; fallopian tubes; ovaries Male: penis; testes; seminal vesicles</td>
<td>Produces gametes (sex cells) and sex hormones.</td>
</tr>
<tr>
<td>Respiratory</td>
<td>Trachea, larynx, pharynx, lungs</td>
<td>Brings air to sites where gas exchange can occur between the blood and cells (around body) or blood and air (lungs).</td>
</tr>
<tr>
<td>Skeletal</td>
<td>Bones, cartilage; ligaments</td>
<td>Supports and protects soft tissues of body; produces blood cells; stores minerals.</td>
</tr>
<tr>
<td>Urinary</td>
<td>Kidneys; urinary bladder</td>
<td>Removes extra water, salts, and waste products from blood and body; controls pH; controls water and salt balance.</td>
</tr>
<tr>
<td>Immune</td>
<td>Bone marrow; spleen; white blood cells</td>
<td>Defends against diseases.</td>
</tr>
</tbody>
</table>

Summary

- The levels of organization in the human body include: cells, tissues, organs, and organ systems.
- There are four tissue types in the body: epithelial tissue, connective tissue, muscle tissue, and nervous tissue.

Explore More

Use the resources below to answer the following questions.

1. What kind of symmetry does the human body plan show? Explain what this means.
2. How does this symmetry extend to our senses?
3. How much of our body is made of muscle? What does this muscle do?
4. How are oxygen and nutrients delivered to the cells of the body?
5. What controls all the activity on the body? How much energy does this organ use?

Go here to see the placement of some organs and body parts. See how fast you can assemble the systems.

- **All Systems Go** at http://scienccenetlinks.com/interactives/systems.html

**Review**

1. What are the four levels of organization in an organism?
2. List the four types of tissues that make up the human body.
3. Describe epithelial tissue.
4. Give two examples of connective tissue.
5. What is the role of the nervous system?
6. What is the role of the cardiovascular system?

**References**
