

Cell Structure and Function ▪ *Section Summary*

Looking Inside Cells

Guide for Reading

- What role do the cell wall and cell membrane play in the cell?
- What are the functions of cell organelles?
- How are cells organized in many-celled organisms?
- How do bacterial cells differ from plant and animal cells?

The **cell wall** is a rigid layer of nonliving material that surrounds the cells of plants and some other organisms. **A plant's cell wall helps to protect and support the cell.** The cell wall is made of a strong, flexible material called cellulose, and many materials can pass through it.

In cells that do not have cell walls, the **cell membrane** is the outside boundary that separates the cell from its environment. All cells have cell membranes. In cells with cell walls, the cell membrane is located just inside the cell wall. **The cell membrane controls what substances come into and out of a cell.**

Inside a cell are tiny structures called **organelles**, which carry out specific functions within the cell. The **nucleus** is a large, oval structure that acts as the "brain" of the cell. **You can think of the nucleus as the cell's control center, directing all of the cell's activities.** The nucleus is surrounded by a protective membrane called the nuclear envelope. Materials pass in and out of the nucleus through small openings, or pores, in the nuclear envelope.

The **cytoplasm** is the region between the cell membrane and the nucleus. Many cell organelles are found in the cytoplasm. The **mitochondria are known as the "powerhouses" of the cell because they convert energy in food molecules to energy the cell can use to carry out its functions.** Passageways called the **endoplasmic reticulum carry proteins and other materials from one part of the cell to another.** Small, grainlike bodies called **ribosomes function as factories to produce proteins.** Collections of sacs and tubes called **Golgi bodies receive proteins and other newly formed materials from the endoplasmic reticulum, package them, and distribute them to other parts of the cell.** The Golgi bodies release materials outside the cell. In plants and some other organisms, large, green structures called **chloroplasts capture energy from sunlight and use it to produce food for the cell.** Large water-filled sacs called **vacuoles are the storage areas of cells.** A vacuole stores food and other materials needed by the cell. Small, round structures called **lysosomes contain chemicals that break down certain materials in the cell.**

Plants and animals contain many cells. In a many-celled organism, the cells are often quite different from each other and are specialized to perform specific functions. **In many-celled organisms, cells are often organized into tissues, organs, and organ systems.** Bacterial cells are smaller and different from plant and animal cells. **While a bacterial cell does have a cell wall and a cell membrane, it does not contain a nucleus. The bacterial cell's genetic material, which looks like a thick, tangled string, is found in the cytoplasm.** Bacterial cells contain ribosomes, but none of the other organelles found in plant or animal cells.