

STRUCTURE AND FUNCTION: Cell Wall and Cell Membrane

You've probably heard about the cell wall and cell membrane before. The cell wall provides protection and support, while the cell membrane controls what enters and exits the cell. But have you ever wondered *how* these organelles perform their functions? It's because of their structure!

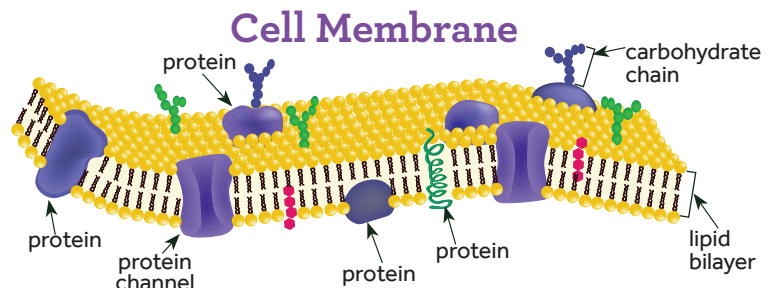
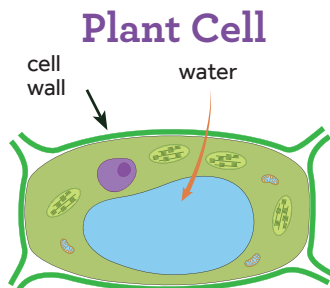
The **cell wall** is a rigid layer surrounding the cell membrane of plant cells. It is made up of complex carbohydrates, or sugars, like cellulose. Cellulose is composed of several thousand simple sugar molecules linked end to end. In other words, it's quite tough! Its composition makes the cell wall strong, enabling it to protect and support the cell.

The cell wall is also porous, meaning it is full of tiny holes. This allows water, minerals, and other nutrients to enter the cell. Though plant cells need lots of water, too much water can be a bad thing. The cell wall prevents **cytolysis** in plant cells, which is when a cell bursts. Without the cell wall, plant cells could take on more and more water, expanding until they pop! Because the cell wall is so rigid, it keeps plant cells from overexpanding and bursting as water enters.

The cell wall also functions to hold the plant up, since plants otherwise have no skeletons. Animal cells do not have cell walls, which has allowed animals to develop a greater diversity of cell types, tissues, and organs than plants. Despite their differences, animal and plant cells have a lot in common. For example, both contain a **cell membrane**.

The cell membrane is composed of a double-layered sheet of **lipids**, or fat molecules, that gives it a flexible structure and forms a barrier between the cell and its surroundings. Only small molecules, like oxygen, are able to pass freely through the lipid layers.

There are many different proteins embedded in the cell membrane. Some of these proteins form channels or pumps to move specific molecules in and out of the cell. There are also carbohydrates attached to the lipids and proteins in the cell membrane. Some of these carbohydrates act like chemical name tags, allowing cells to identify each other. Because the cell membrane contains so many different types of molecules, it is often described as a mosaic by scientists.



Show what you know about the cell wall and cell membrane by answering the questions below. **Sample answers**

1. What makes the cell wall so strong? **The cell wall is composed of complex carbohydrates that form a tough, rigid layer of protection and support around the cell.**
2. How does the cell wall prevent cytolysis? **Because the cell wall is so rigid, it keeps plant cells from bursting as water enters.**
3. A **semipermeable** membrane describes a membrane that allows only certain molecules to pass through it. Give **two** examples of how the cell membrane is semipermeable. **Only small molecules, like oxygen, are able to pass through the lipid layers of the cell membrane. Also, some of the proteins embedded in the cell membrane form channels or pumps to move specific molecules in and out of the cell.**
4. What is a function of the carbohydrates attached to the cell membrane? **The carbohydrates act like a chemical name tag for the cell, allowing it to be recognized by other cells.**