Ahlulbait University **Human biology**
College of Pharmacy **Stage : 1 st**
MSC. Etab A. AL-Mosawe **Lab:2**

Cell Structure and Function

The cell is the lowest level of structure capable of performing all the activities of life. The first cells were observed and named by Robert Hooke in 1665 from slice of cork.

Human beings are highly organized. A cell is the basic unit of life, and human beings are multicellular since they are composed of many types of cells. Like cells form tissues, and tissues make up organs.

• All living organisms are made of cells. A cell is a small membrane enclosed structure filled with an aqueous solution where organelles and other *subcellular* structures are found.

• Cells are of different size and shape.

• The cell's size and shape can be related to its specific function.

CELL THEORY

The cell theory, developed in the mid-nineteenth century, provided scientists with a clearer insight of the study of life. The cell theory involves the following three aspects:

1. Every living organism is composed of one or more cells.

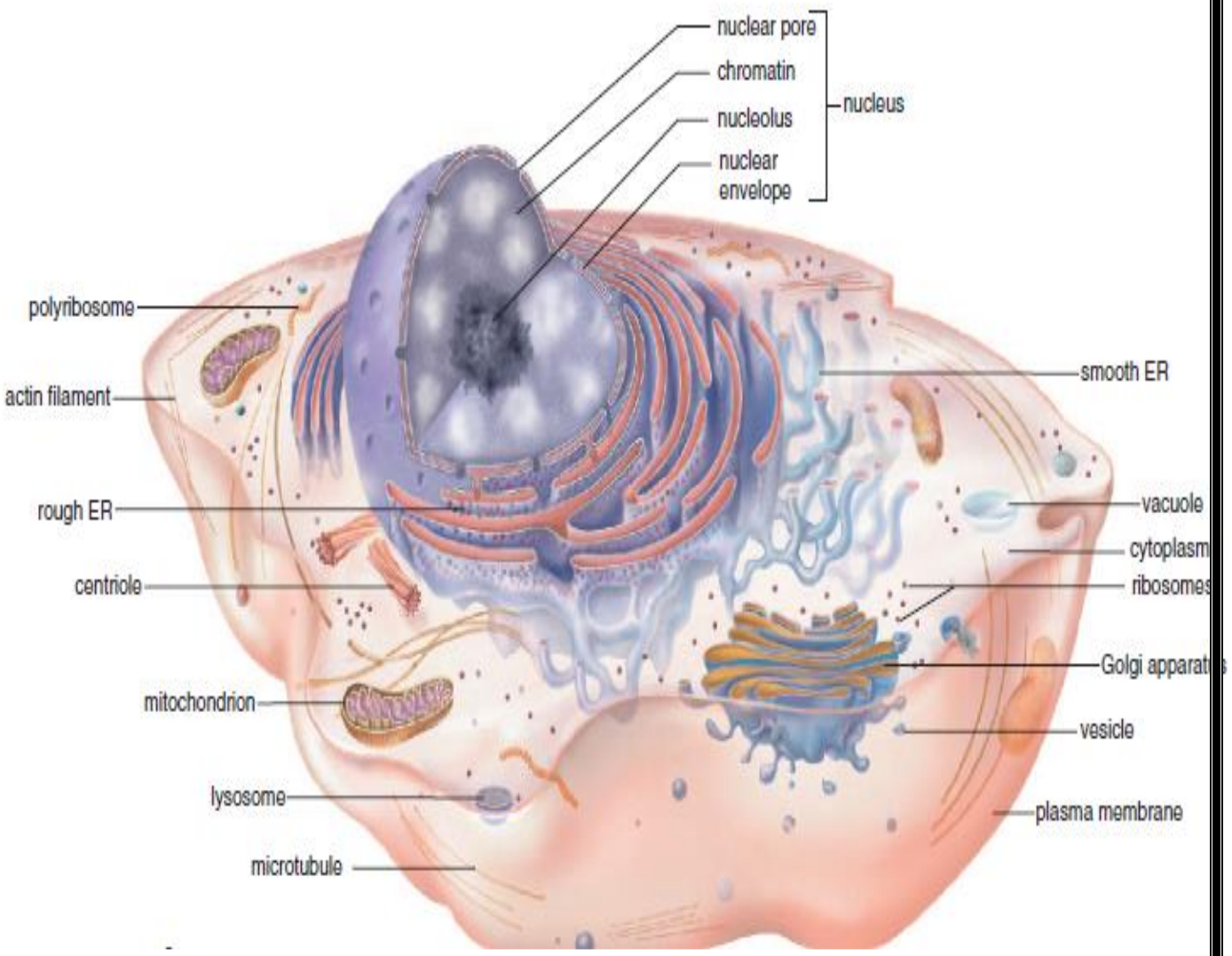
2. Cells are the smallest units that have the properties of life.

3. The continuity of life has a cellular basis.

Eukaryotic cell structure

The human cell has a central nucleus and an outer plasma membrane. Various organelles are found within the cytoplasm, the portion of the cell between the nucleus and the plasma membrane.

Plasma membrane, Nucleus, Nucleolus, Ribosome, Endoplasmic reticulum {Rough ER, Smooth ER}, Golgi apparatus, Mitochondria, Lysosomes, Vacuoles, Vesicles, Cilia and flagella, and Centriole



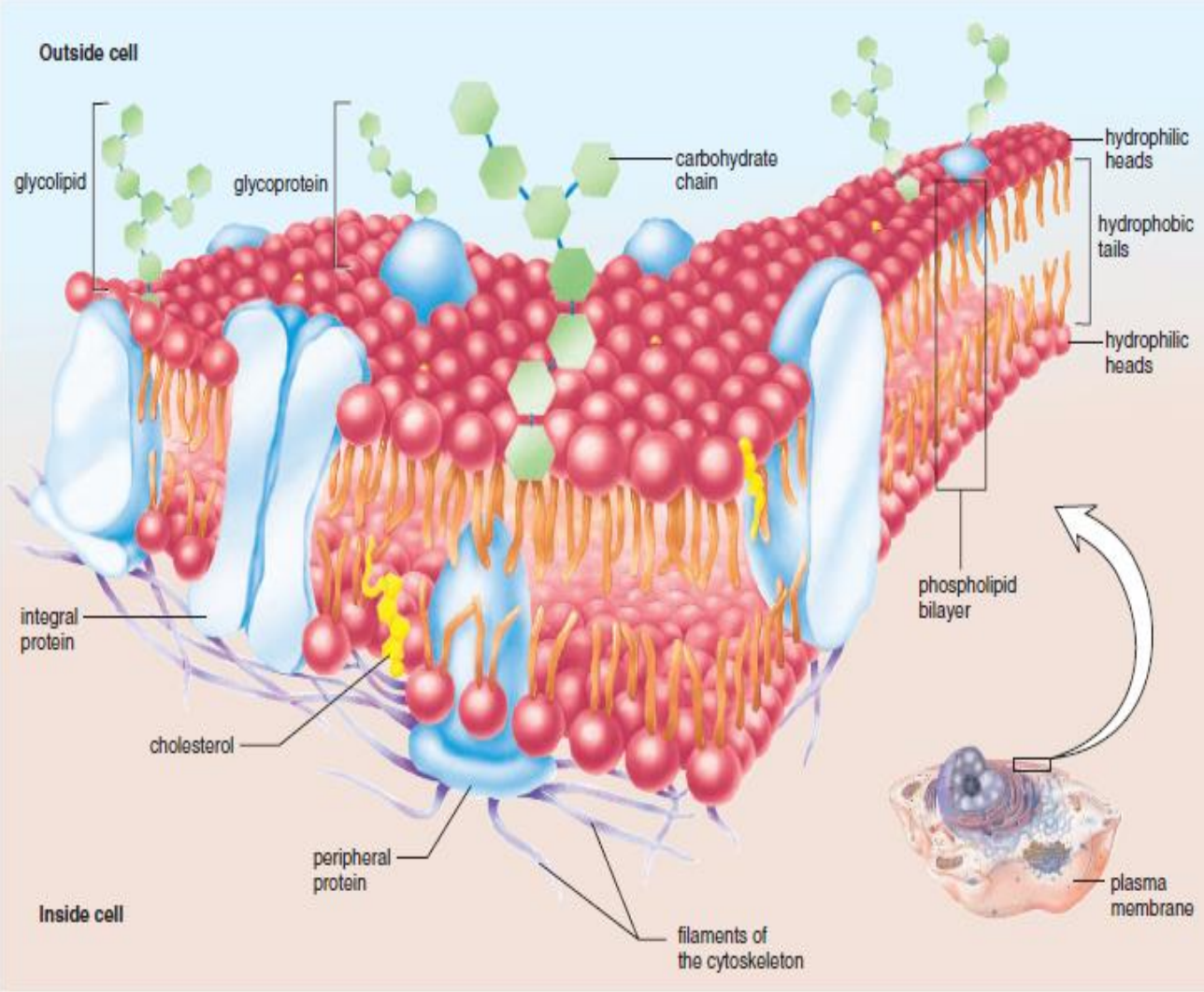
Eukaryotic cell

Table 3.1 Structures in Animal Cells

Name	Composition	Function
Plasma membrane	Phospholipid bilayer with embedded proteins	Selective passage of molecules into and out of cell
Nucleus	Nuclear envelope surrounding nucleoplasm, chromatin, and nucleolus	Storage of genetic information
Nucleolus	Concentrated area of chromatin, RNA, and proteins	Ribosomal formation
Ribosome	Protein and RNA in two subunits	Protein synthesis
Endoplasmic reticulum (ER)	Membranous saccules and canals	Synthesis and/or modification of proteins and other substances, and transport by vesicle formation
Rough ER	Studded with ribosomes	Protein synthesis
Smooth ER	Having no ribosomes	Various; lipid synthesis in some cells
Golgi apparatus	Stack of membranous saccules	Processing, packaging, and distributing molecules
Vacuole and vesicle	Membranous sacs	Storage and transport of substances
Lysosome	Membranous vesicle containing digestive enzymes	Intracellular digestion
Mitochondrion	Inner membrane (cristae) within outer membrane	Cellular respiration

Plasma Membrane Functions

The plasma membrane keeps a cell intact. It allows only certain molecules and ions to enter and exit the cytoplasm freely; therefore, the plasma membrane is said to be **selectively permeable.** Small molecules that are lipid soluble, such as oxygen and carbon dioxide, can pass through the membrane easily. Certain other small molecules, like water, are not lipid soluble, but they still freely cross the membrane. Still other molecules and ions require the use of a carrier to enter a cell.



Plasma membrane

CELLULAR TRANSPORT MECHANISMS

Mechanism	Definition	Example in the Body
Diffusion	Movement of molecules from an area of greater concentration to an area of lesser concentration.	Exchange of gases in the lungs or body tissues.
Osmosis	The diffusion of water.	Absorption of water by the small intestine or kidneys.
Facilitated diffusion	Carrier and transporter enzymes move molecules across cell membranes.	Intake of glucose by most cells.
Active transport	Movement of molecules from an area of lesser concentration to an area of greater concentration (requires ATP).	Absorption of amino acids and glucose from food by the cells of the small intestine. Sodium and potassium pumps in muscle and nerve cells.
Filtration	Movement of water and dissolved substances from an area of higher pressure to an area of lower pressure (blood pressure).	Formation of tissue fluid; the first step in the formation of urine.
Phagocytosis	A moving cell engulfs something.	White blood cells engulf bacteria.
Pinocytosis	A stationary cell engulfs something.	Cells of the kidney tubules reabsorb small proteins.

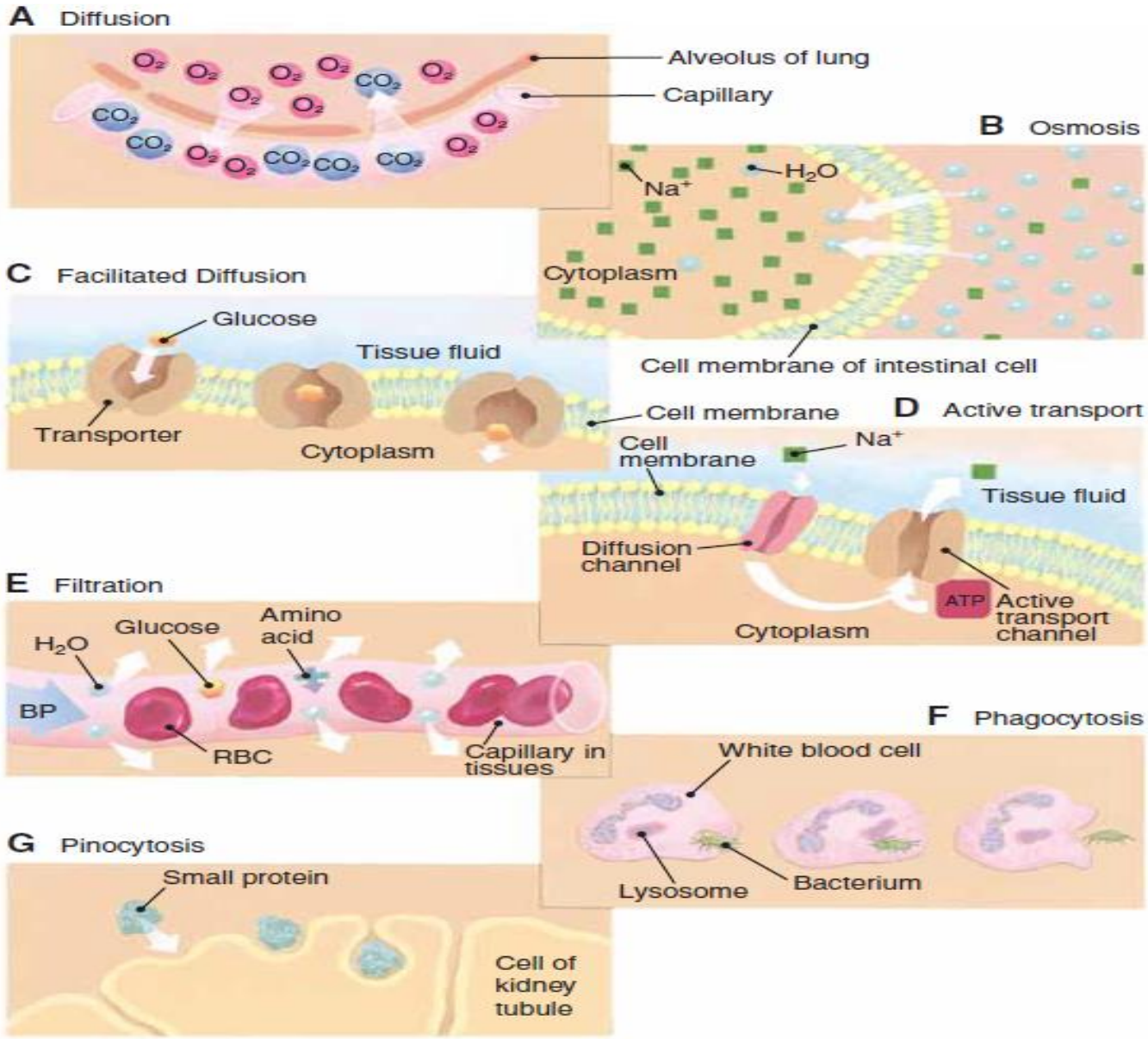


Figure 3–3. Cellular transport mechanisms. (**A**) Diffusion in an alveolus in the lung. (**B**) Osmosis in the small intestine. (**C**) Facilitated diffusion in a muscle cell. (**D**) Active transport in a muscle cell. (**E**) Filtration in a capillary. (**F**) Phagocytosis by a white blood cell. (**G**) Pinocytosis by a cell of the kidney tubules. See text for description.