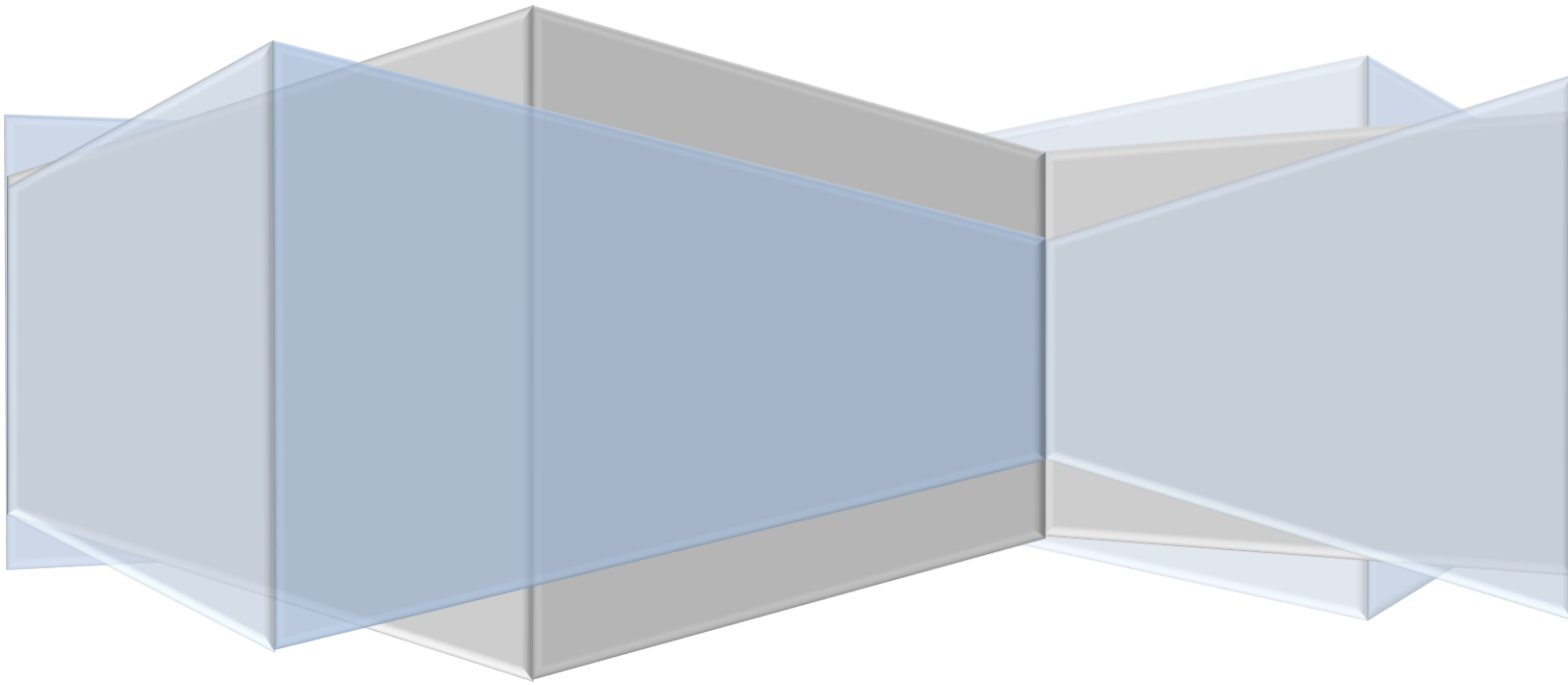
Basrah University
Pharmacy College

Human Biology

Cells structures

Dr. Rawaa Salim Hameed



Cells structures

A cell examined under the light microscope will reveal an outer cell membrane enclosing an inner fluid, jelly–like area called the **cytoplasm**. Within the cytoplasm are many parts that do different functions these parts are called **organelles** (small organs). Cytoplasm is about 70% water in which salts are dissolved to form a solution. There are also suspended within it large molecules, such as proteins which cannot dissolve in the water. A cell consists of three main parts: **nucleus, cell membrane and cytoplasm**.

The nucleus

The nucleus is a large organelle that may or may not be centrally within the cytoplasm. It is enveloped in a double membrane that has nuclear pores to permit the two-way traffic of large molecules. When a special type of stain (hematoxylin) is put on to a cell the nucleus soaks up the color. The areas within the nucleus that become colored are described as **chromatin**. When the cell divides into two, chromatin coils up into rod–like **chromosomes**. Chemically chromatin (and therefore chromosome) is made up of large protein molecules and **DNA** (**deoxyribonucleic acid**). It is **DNA** together with **RNA** (**ribonucleic acid**) that controls the production of proteins by cells. The nucleic acids are the inheritance factors of cells. Most nuclei contain at least one nucleolus (plural, nucleoli), this is made up of RNA and aids in the production of structures called **ribosomes**.

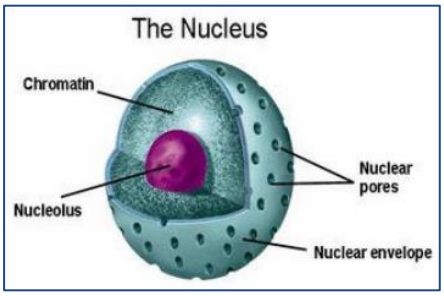


Figure 4: The nucleus

Endoplasmic reticulum (ER)

The endoplasmic reticulum is a system of double-membraned tubular canals running throughout the cytoplasm. Some of these membranes are dotted with extremely small granular particles called **ribosomes**. This membrane with ribosomes is described as **rough endoplasmic reticulum** and is the site of protein synthesis. The membranes without ribosomes are described as **smooth endoplasmic reticulum**, it is suggested that

here fatty substances are synthesized as are some hormones. It is may also be true that dangerous chemicals are destroyed (detoxified) by enzymes located on these membranes.

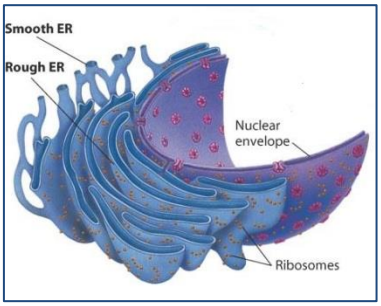


Figure 5: Endoplasmic reticulum

Golgi bodies (or Golgi apparatus)

Golgi bodies were first discovered by the Italian scientist Camillo Golgi, who noted that these membranous sacs increased in size and filled up when a cell produced secretions. These packages of chemicals then snip off from the main Golgi apparatus and migrate to the outer cell membrane where they discharge to the outside. The packages are called **vacuoles** or if they are extremely small, **vesicles**.

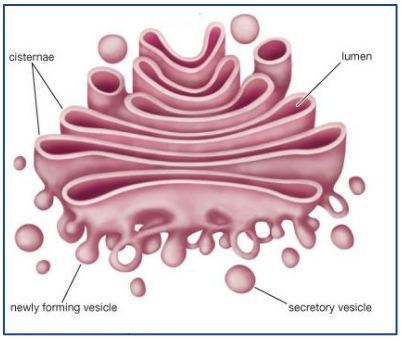


Figure 6: Golgi apparatus

Lysosomes

Lysosomes are vacuoles that probably snip-off from Golgi apparatus. They contain enzymes (**lysozymes**) that break down the cell material itself by a process of **self-digestion** or **autolysis**. They are therefore a danger to the life of the cell if released.

The plasma membrane (cell membrane)

The plasma membrane encloses all the cell components; it is a double structure like the endoplasmic reticulum. It regulates what enters and exits the cell. The currently accepted model for the structure of the plasma membrane, called **the fluid mosaic model**. According to the fluid mosaic model, the plasma membrane is a mosaic of components-primarily, phospholipids, cholesterol, and proteins-that move freely and fluidly in the plane of the membrane.

The principal components of the plasma membrane are:-

1- Phospholipid bilayer: (two layers of phospholipids): Phospholipids are lipids with a phosphate group attached to them. The phospholipids have one head and two tails. The head is polar and hydrophilic, or water-loving. The tails are nonpolar and hydrophobic, or water-fearing.

2- Proteins: There are many different types of proteins associated with the phospholipid bilayer. Some lie in just one of the phospholipids layers **peripheral (extrinsic proteins)** and some span both layers **integral (intrinsic proteins)**.

3- Carbohydrate: groups that are attached to some of the lipids and proteins.

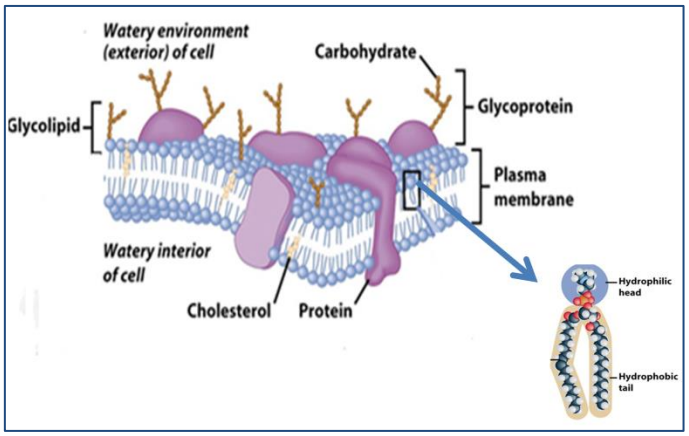


Figure 7: The fluid mosaic model

Mitochondria

A mitochondrion is a fluid-filled tubular structure surrounded by double membrane. The inner membrane is folded into projections called **cristae**, and it is on these cristae that the energy-producing enzymes are located. Mitochondria are frequently described as the

powerhouses of cell because here cellular respiration takes place and energy stored in the molecule **ATP** is produced. It is called **cellular respiration** because the cell take up the oxygen that we respire (breath in) and the glucose produced by digestion of the food that we eat and convert it to carbon dioxide and water in a chemical reaction that gives off energy. It is summarized by this equation:- Glucose + oxygen carbon dioxide + water

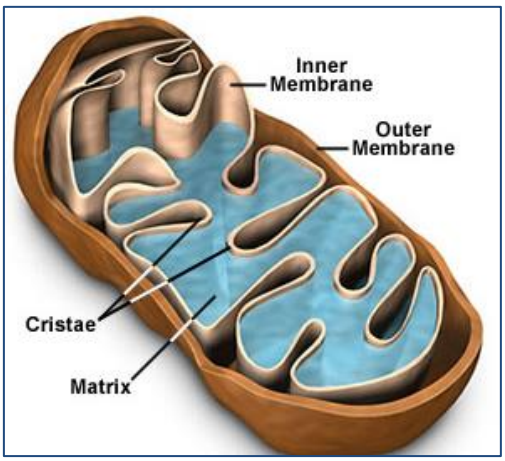


Figure 8: Mitochondrion