

## Lab: 2

**Biology** : Is the science of living things Biology com from the Greek bios means life and Logos means word or knowledge ,Biology includes the study of evolutionary relationships among organisms and the diversity of life on earth , Cells the basic structural functional and biological unit of all living organisms \* Term cell com from Latin cella meaning \_‘small room \_‘

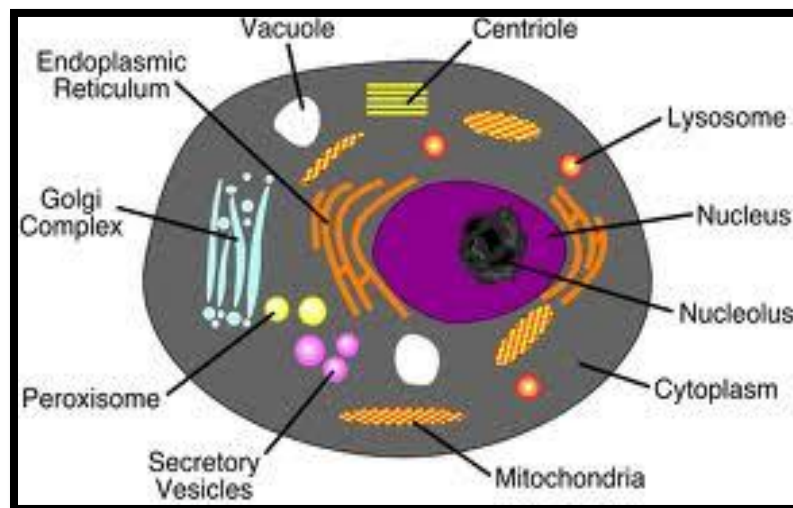
### The animal cell

**Cell**: It is the basic unit of **structure & function** in an organism.

**Cell theory**: Every living organism is composed of cell and every cell in an organism produced by another cell. All cells have genetic material required to regulate cell functions and replicate , passing this genetic information to new cell

To understand the function of organs and other structures of the body, it is essential that we first understand the basic organization of the cell and the functions of its component parts.

### The main parts of cell (cell structure):



## **Living & non-living component in cell**

### **A- Living component**

1- **Cell membrane:** is a thin semi permeable membrane surrounds the part of a cell together, it controls the movement of material into and out of a cell. while keeping other substances out. The cell membrane is primarily composed of a mix of proteins and lipids. Depending on the membrane's location and role in the body, lipids can make up anywhere from 20 to 80 percent of the membrane, with the remainder being proteins. While lipids help to give membranes their flexibility, proteins monitor and maintain the cell's chemical climate and assist in the transfer of molecules across the membrane.

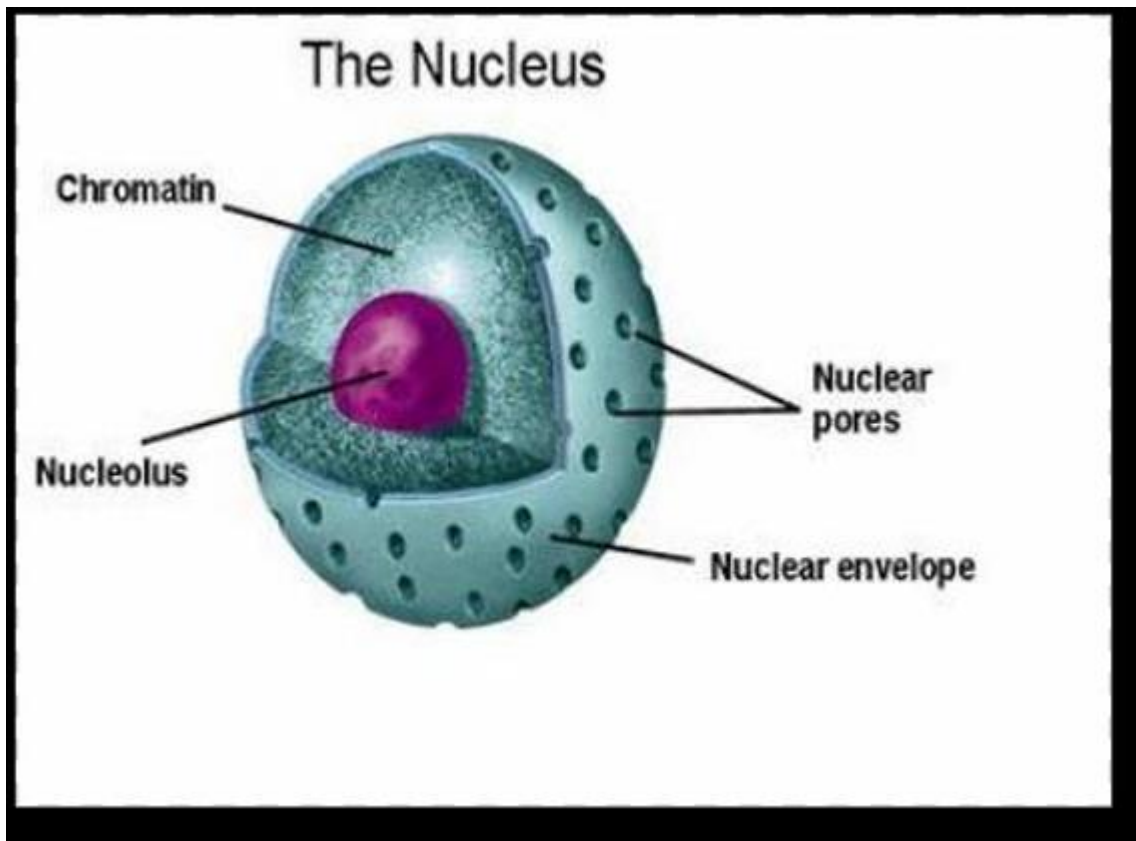
2- **Nucleus** :is a large organelle that store the cell's DNA (deoxyribonucleic acid) . The nucleus control all of the cells activities such as growth and metabolism , using the DNAs genetic information .

#### **Structure of Nucleus :**

a)Nuclear membrane b)Nucleoplasm. c) Chromatin network. d) Nucleolus.

#### **Function:**

- 1)Nucleus plays a major role in the general metabolism of the cell .
- 2) it is helpful in the synthesis of the Ribosomes .
- 3) it is helpful in the synthesis of RNA .
- 4) it controls the synthesis of protein.
- 5) it is the seat of heredity.



3- **Cytoplasm:** Its substance between the cell membrane and the nucleus, which contains cytosol and organelles, it makes up most of the mass of many cells.

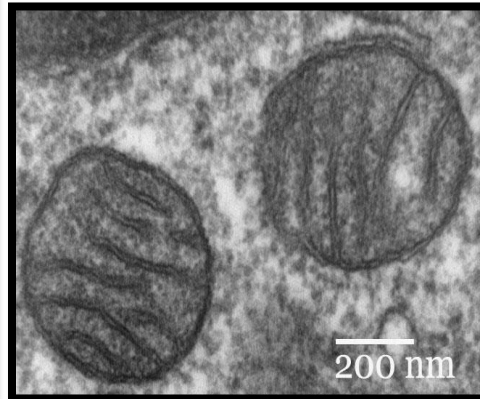
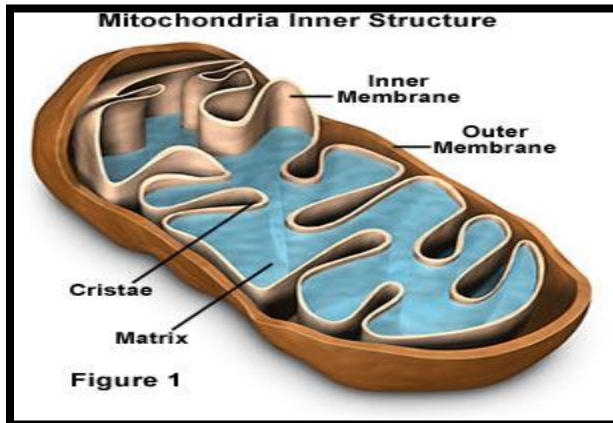
**Function:** produces variety of cell materials.

4- **Mitochondria:** Are rod- shaped in the cytoplasm.

These organelles transform the chemical energy of the metabolites present in cytoplasm into energy that is easily accessible to the cell.

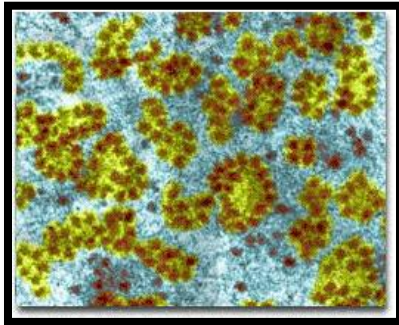
About 50% of this energy is stored as high- energy phosphate bonds in ATP molecules. ATPase releases energy when required by the cell to perform type of work.

**Function:** Release energy & it is called (power house of cell)



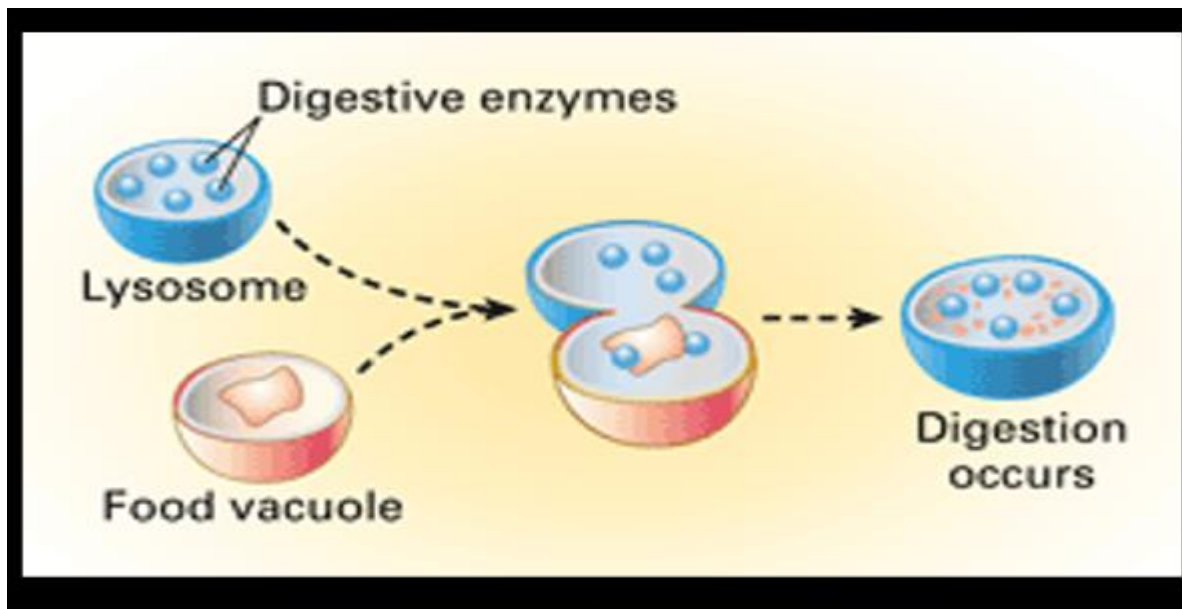
**5- Ribosomes:** Are tiny- particles, so small. They can see only with an electron microscope. Ribosomes are the protein factories of the cell. Composed of two subunits , they can be found floating freely in the cells cytoplasm or embedded within endoplasmic reticulum .

**Function:** it is site of protein synthesis because it consisting of RNA and protein.

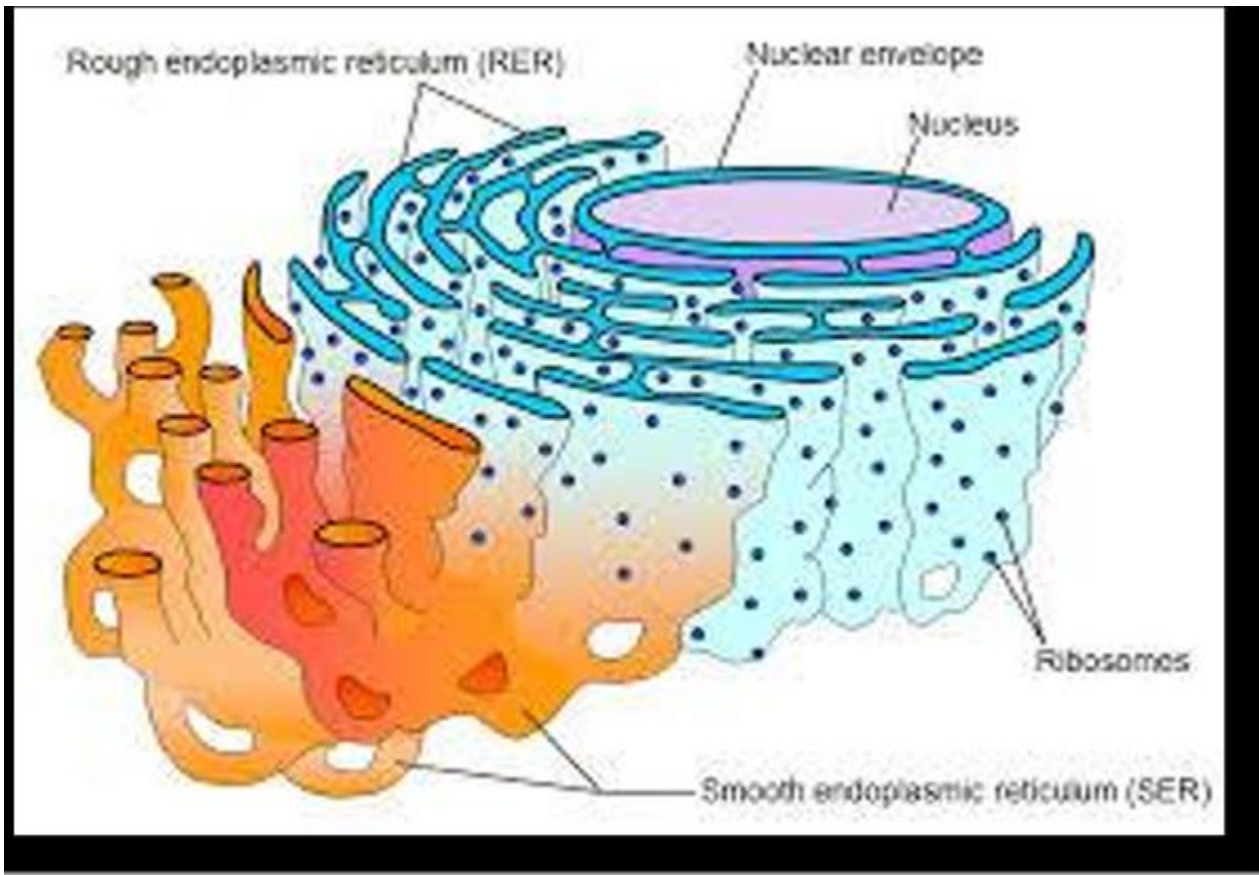


**6-Lysosome:** round organelles surrounded by a membrane and containing digestive enzymes.

The lysosomes provide an intracellular digestive system that allows the cell to digest (1) damaged cellular structures, (2) food particles that have been ingested by the cell, and (3) unwanted matter such as bacteria.

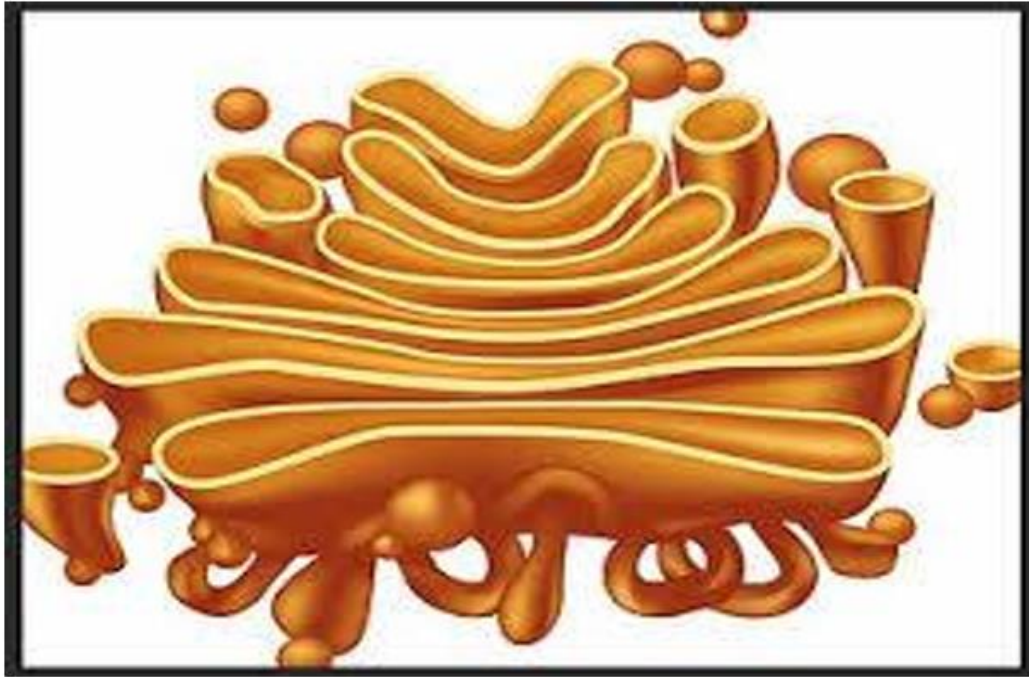


7- **Endoplasmic reticulum:** is a membranous organelle that shares part of its membrane with that of nucleus . some portion of ER ,known as the rouge ER ,are studded with ribosomes and are involved with protein manufacture .the rest of the organelle is referred to as the smooth ER and serves to produce vital lipids (fats). **Function** Both the smooth and rough endoplasmic reticulum help in the production and storage of protein. The main difference is that one contains ribosomes on it and the others does not . This organelle helps process molecules made by the cell and transports them to their specific destinations inside or outside the cell.



## 8- Golgi Apparatus

If the protein from the rough ER require further modification , They are transported to the Golgi apparatus (or Golgi complex ) .Like the ER ,the Golgi apparatus is composed of folded membranes . it searches the proteins amino acid sequences for specialized "codes" and modifies them accordingly .these processed protein are then stored in the Golgi or packed in vesicles to be shaped elsewhere in the cell.



## **B- Non Living component**

**Vacuoles:** is a liquid- filled sphere surrounded by a membrane.

**Function:** stores water & dissolved materials.

Note: You can see these types of structures in Amoeba or Paramecium

- **Organisms are divided according to number of cells:**

1- **Unicellular Organisms:** some Organisms are single cells are called unicellular e.x.: Bacteria, Amoeba and Euglena.

2- **Multicellular Organisms:** some Organisms have many cells are called multicellular e.x.: Animal tissue & Plant tissue.

**We can divide the organisms to:**

**1-Eukaryotic**

**2-Prokaryotic**

	<b>Eukaryotic</b>	<b>Prokaryotic</b>
<b>1-nucleus</b>	present	Absent
<b>2-nucleous membrane</b>	present	Absent
<b>3-mitochondria</b>	present	Absent
<b>4-ribosomes</b>	larger	Smaller
<b>5-number of chromosomes</b>	More than one	One
<b>6-number of cells</b>	multicellular	Unicellular
<b>7-ex:</b>	Animal, plant	Bacteria

