



ALAYEN UNIVERSITY

ANESTHESIA  
DEPARTMENT

FIREST STAGE

**BIOLOGY**

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### **Biology :Is the science of living things**

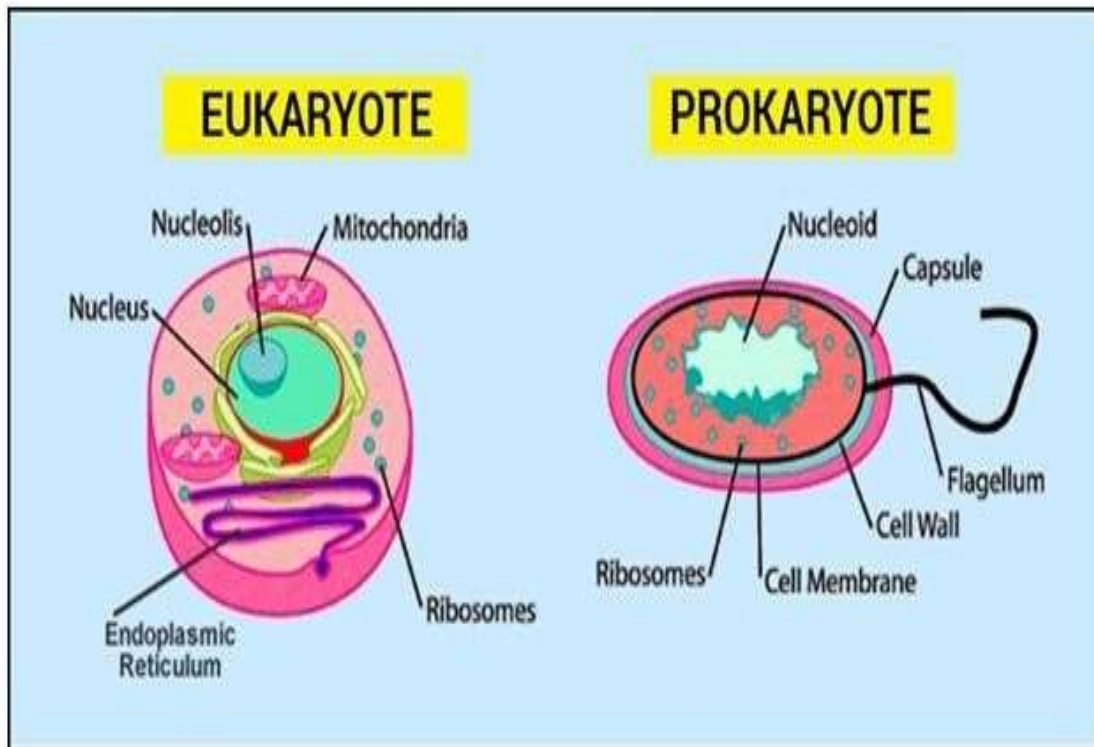
Biology com from the Greek bios means life and Logos means word or knowledge ,Biology includes the study of evolutionary relationships among organisms and the diversity of life on earth , Cells the basic structural, functional and biological unit of all living organisms

\* Term cell com from Latin cella meaning ==‘small room ==‘

### **Prokaryotic and Eukaryotic**

**Prokaryotic** : are organisms without a cell nucleus or any other membrane-bound organelles, such as Archaea and  
Bacteria

**Eukaryotic** :Eukaryotic cells are cells that contain a nucleus and organelles, and are enclosed by a [plasma membrane](#). Organisms that have eukaryotic cells include protozoa, fungi, plants and animals.  
. Eukaryotic cells are larger and more complex than prokaryotic cells



prokaryotic have a larger surface area to volume ratio giving them a higher metabolic rate a higher growth rate and consequently a shorter generation time compared to Eukaryotes .

**Unicellular organisms** : organisms that have only one cell such as Amoeba

**Multicellular organisms** : organisms that have many cells this cell form the tissue and organs

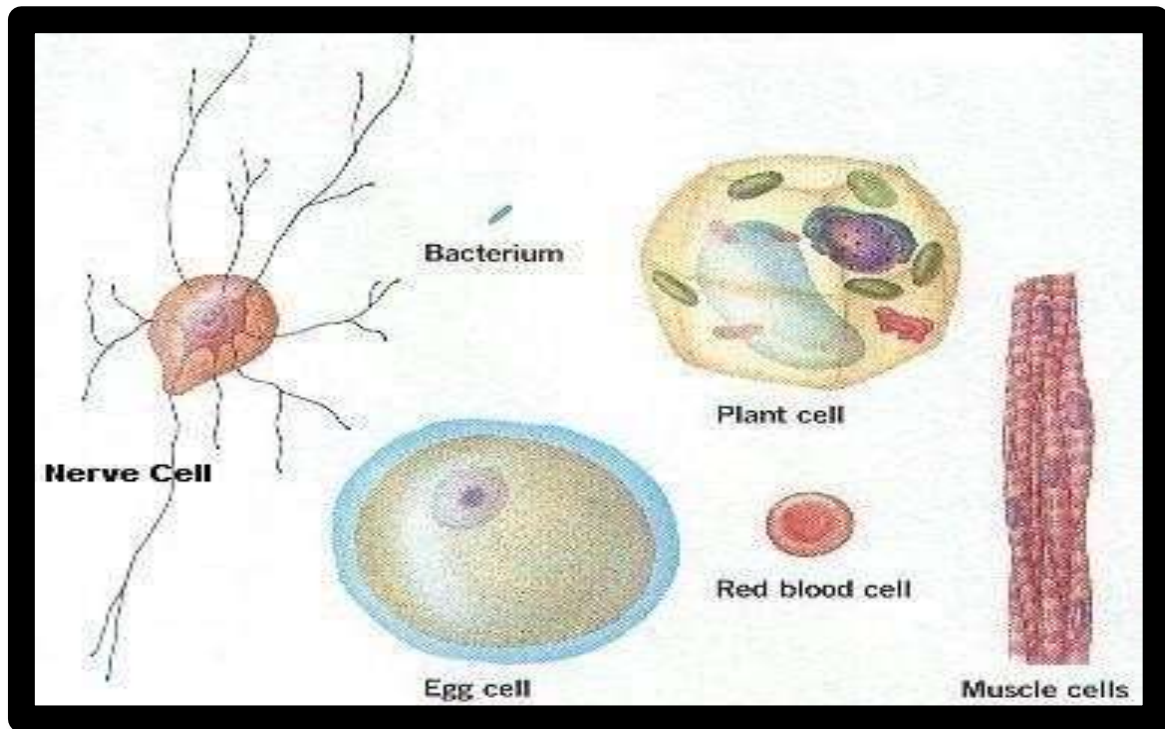
### Cell are typically composed of

- Cell membrane (Plasma membrane) .1
- Cytoplasm and its organelles such as ( mitochondria, endoplasmic reticulum , Ribosome's, Golgi complex etc,. .2
- True nucleus .3

### Cell shape:

There is no typical shape ,but generally the cells are rounded or spherical , oval, cuboidal ,cylindrical ,flat etc,.

the shape of cells depending mainly on functional adaptation and partly on the surface tension and viscosity of cytoplasm, the mechanical action of adjoining cells and rigidity of the cell membrane .



### Cell Number

— Some organisms like protozoans are single cell and others are multicellular. The body of human being is composed of about 26 trillions of cells. In human blood, the number of erythrocytes is about five million per cubic ml of blood, and about 10 billion neurons constitute the nervous system in human being.

### Cell size

The size of different cells ranges within broad limits, some plant and animal cells are visible to the naked eye, such as eggs, but the majority of cells are visible only under microscope. The size of human RBC is 7-8  $\mu$  in diameter.

## Lec 2 Organelles and their function

### Cell structure

Cells are typically composed of

- 1- cell membrane (Plasma membrane)
- 2- Cytoplasm and its organelles
- True nucleus 3

### Cell Membrane Function and Structure

The cell membrane (plasma membrane) is a thin semi-permeable membrane that surrounds the cytoplasm of a cell.

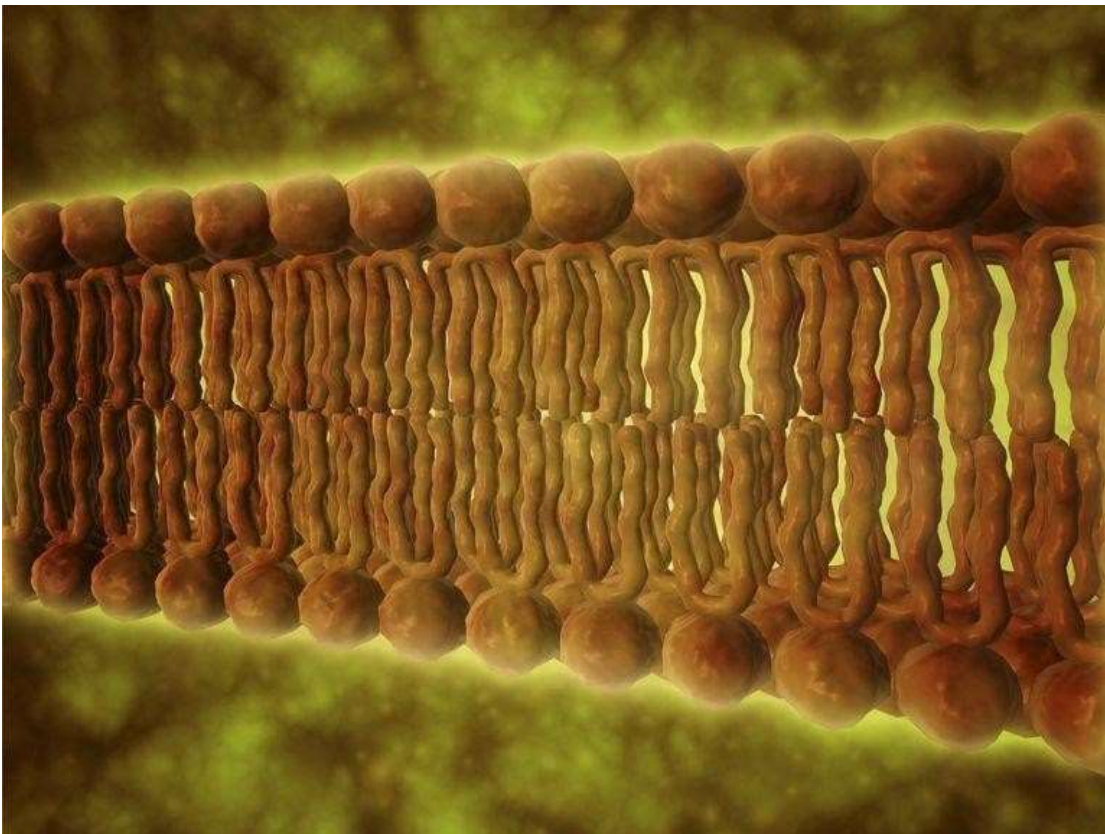
Its function is

to protect the integrity of the interior of the cell by allowing .1  
certain substances into the cell, while keeping other  
substances out.

It also serves as a base of attachment for the .2  
cytoskeleton in some organisms and the cell wall in others.  
cell membrane help support the cell and help maintain its .3  
shape.

## Cell Membrane Structure

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. 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.



**Cell Membrane Structure**

## Organelles and their function

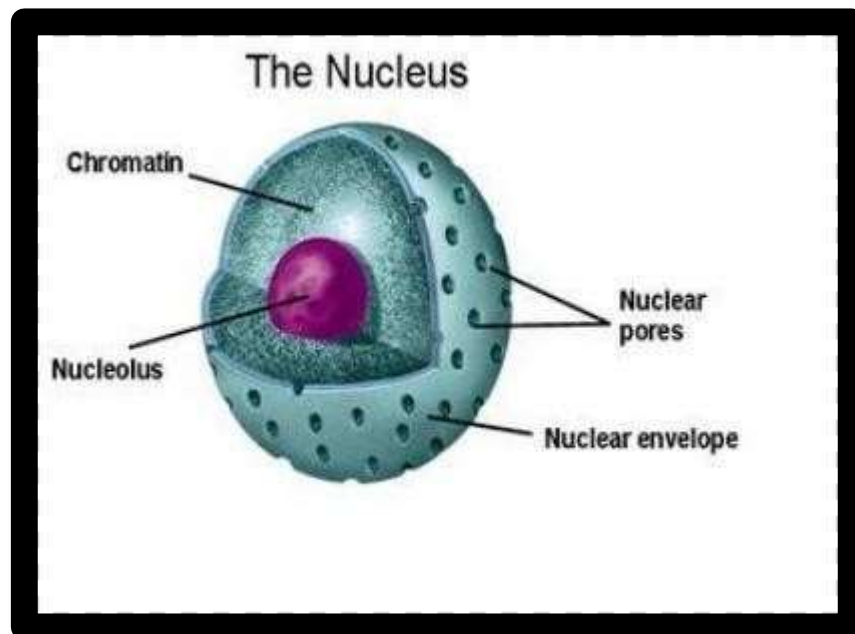
### Nucleus: 1

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.
- Chromatin network. (c
- Nucleolus. (d



### NUCLEUS STRUCTURE

### Function of Nucleus:

Nucleus plays a major role in the general metabolism of (1 the cell .

it is helpful in the synthesis of the Ribosomes . (2

it is helpful in the synthesis of RNA . (3

it controls the synthesis of protein. (4

it is the seat of heredity. (5

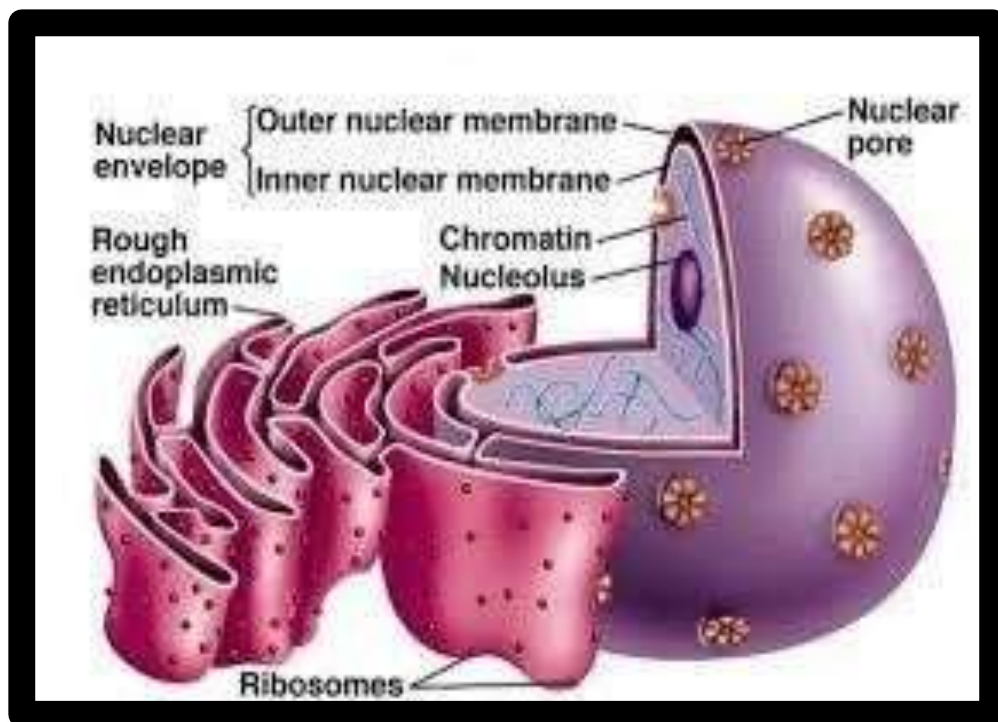
## **Ribosomes: 2**

Ribosomes are the protein factories of the cell. Composed of two subunits, they can be found floating freely in the cell's cytoplasm or embedded within endoplasmic reticulum.

## **Endoplasmic reticulum: 3**

**The endoplasmic reticulum (ER)** is a membranous organelle that shares part of its membrane with that of nucleus. Some portion of ER, known as the rough 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).

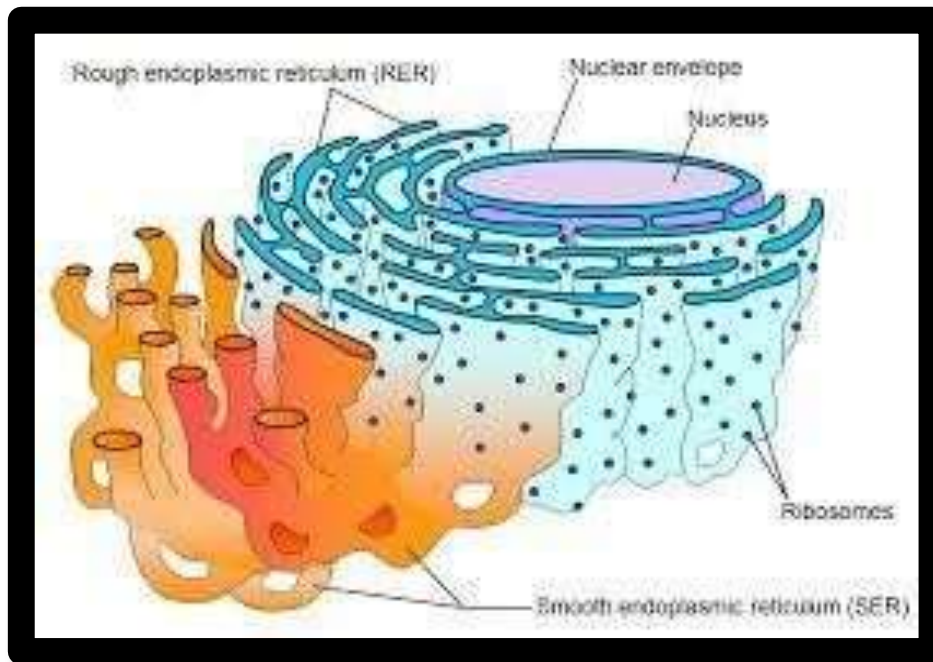
Both the smooth and rough endoplasmic reticulum help in the production and storage of protein. The main difference is that one contains ribosomes on it and the other does not.



**ROUGH ENDOPLASMIC RETICULUM**



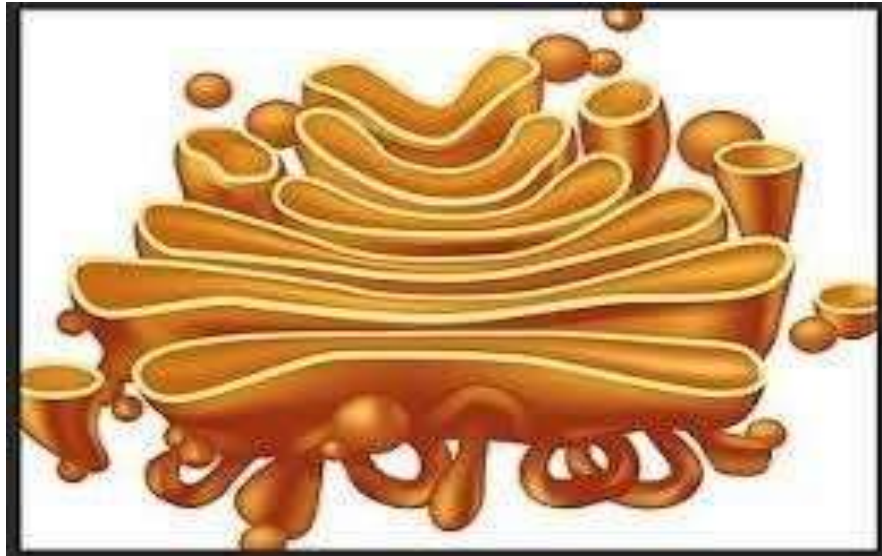
**The smooth endoplasmic reticulum (SER)** does not contain ribosomes .The SER helps in the storage of protein and lipids .Cells that produce oils have a higher rate of SERs than do other cells .The smooth endoplasmic reticulum can be found dispersed throughout the cytoplasmic of the cell.



## SMOOTH ENDOPLASMIC RETICULUM

### 4- 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.



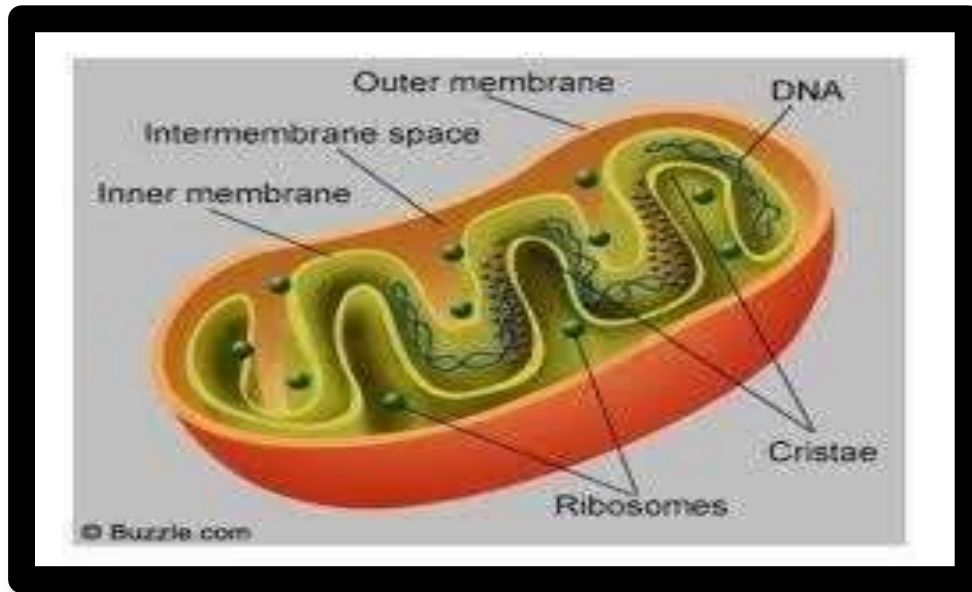
## **GOLGI APPARATUS**

### **Chloroplast: 5**

Plant and some algae contain organelles known as chloroplasts, which serve as the site of photosynthesis. Chloroplasts contain a pigment known as chlorophyll, which captures the sun's energy to transform water and carbon dioxide into glucose for food.

### **Mitochondria : 6**

Mitochondria are oval-shaped organelles found in most eukaryotic cells. As the site of cellular respiration, mitochondria serve to transform molecules such as glucose into an energy molecule known as ATP (adenosine triphosphate). ATP fuels cellular processes by breaking its high-energy chemical bonds. Mitochondria are most plentiful in cells that require significant amounts of energy to function. Such as liver muscle cells.



## MITOCHONDRIA STRUCTURE

Thanks