

## The cell

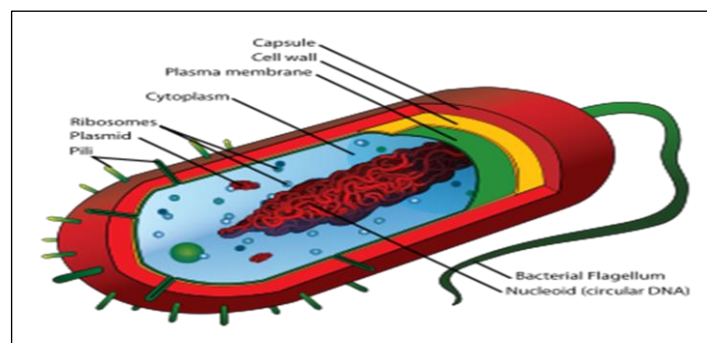
The cell is the basic structural, functional, and biological unit of all known living organisms. It is the smallest unit of life. Cells are often called the "building blocks of life". The study of cells is called cell biology.

All cells have three things in common no matter what's type they are; all cells have a membrane which separate inside the cell from outer environment, cytoplasm which is jelly like fluid and DNA which is cell genetic material. Organisms can be classified as unicellular (consisting of a single cell; including bacteria) or multicellular (including plants and animals).

Cells are of two types: eukaryotic, which contain a nucleus, and prokaryotic, which do not. Prokaryotes are single-celled organisms, while eukaryotes can be either single-celled or multicellular.

### Prokaryotic cells

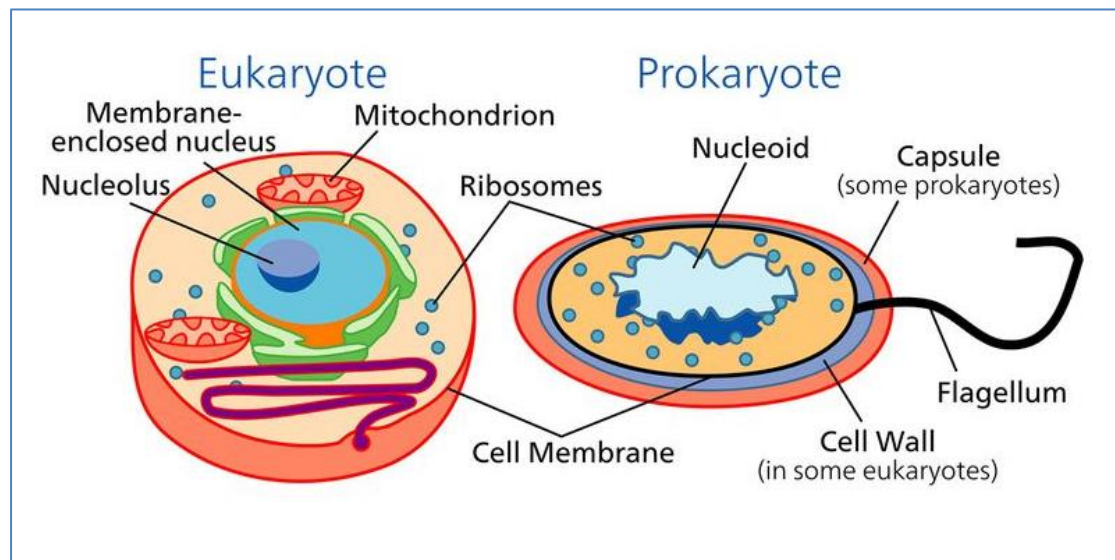
Prokaryotes include bacteria and archaea, two of the three domains of life. Prokaryotic cells were the first form of life on Earth. They are simpler and smaller than eukaryotic cells, and lack membrane-bound organelles such as a nucleus. The DNA of a prokaryotic cell consists of a single chromosome that is in direct contact with the cytoplasm. The nuclear region in the cytoplasm is called the nucleoid. Most prokaryotes are the smallest of all organisms ranging from 0.5 to 2.0  $\mu\text{m}$  in diameter.



## Eukaryotic cells

Plants, animals, fungi, protozoa, and algae are all eukaryotic. These cells are about fifteen times wider than a typical prokaryote. The main distinguishing feature of eukaryotes as compared to prokaryotes is compartmentalization: the presence of membrane-bound organelles (compartments) in which specific activities take place. Most important among these is a cell nucleus, an organelle that houses the cell's DNA. This nucleus gives the eukaryote its name.

The plasma membrane resembles that of prokaryotes in function, with minor differences in the setup. Cell walls may or may not be present. few cells, such as a hen's egg or a frog's egg, are large enough to be seen by the naked eye but most cells are much smaller and can be seen only under a microscope. The small size of cells means that they are measured using the smaller units of the metric system, such as the micrometer ( $\mu\text{m}$ ) (a micrometer is 1/1,000 millimeter).



The following facts about cells will provide you with well known and perhaps little known tidbits of information about cells.

- 1- Cells are too small to be seen without magnification.
- 2- There are two primary types of cells.
- 3- Cells contain genetic material.
- 4- Cells contain structures called organelles which carry out specific functions.
- 5- Different types of cells reproduce through different methods.
- 6- Groups of similar cells form tissues.
- 7- Cells have varying life spans.

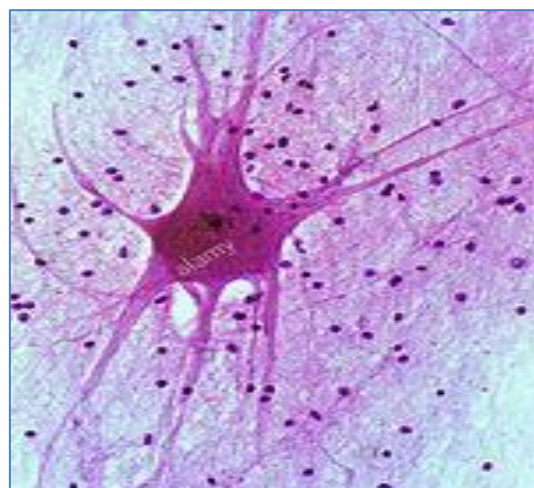
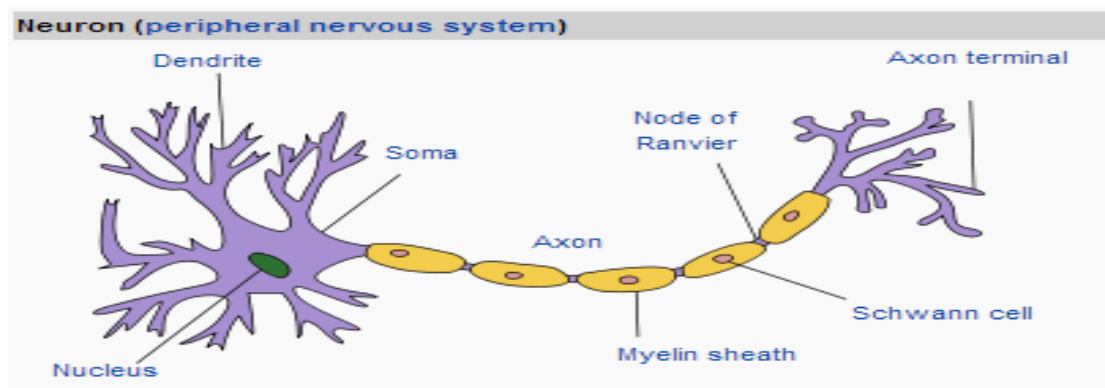
What are the differences between prokaryotic and eukaryotic cell?

	Prokaryotes	Eukaryotes
Typical organisms	bacteria	Protoctista, fungi, plants, animals
Typical size	~ 1-10 $\mu\text{m}$	~ 10-100 $\mu\text{m}$ (sperm cells) apart from the tail, are smaller)
Type of nucleus	Nuclear body No nucleus	real nucleus with nuclear envelope
DNA	circular (ccc DNA)	linear molecules (chromosomes) with histone proteins
Ribosomes	70S	80S
Cytoplasmatic structure	very few structures	highly structured by membranes and a cytoskeleton
Cell movement	Flagellae/cilia made of flagellin	flagellae and cilia made of tubulin
Mitochondria	none	1 - 100 (though RBC's have none)
Chloroplasts	none	in algae and plants
Organization	usually single cells	single cells, colonies, higher multicellular organisms with specialized cells
Cell division	Binary fission (simple division)	Mitosis (normal cell replication) Meiosis (gamete production)

There are different types of human cells, the most important cells including the following.

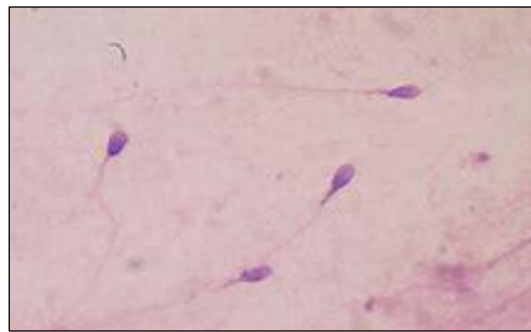
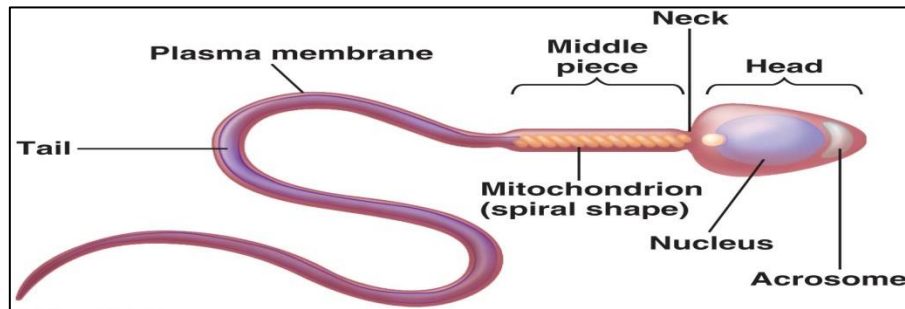
### **Nerve cell:**

a nerve cell also called a neuron is a specialized type of cells which receive and transmit signals. Each neuron contains a nerve cell body with a nucleus and organelles such as mitochondria, endoplasmic reticulum and Colgi apparatus.



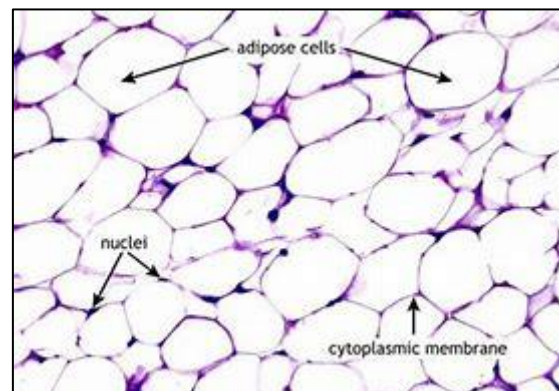
### Sperm cells:

the term sperm refers to the male reproductive cells. The sperm consists of a head, a mid piece and a tail.



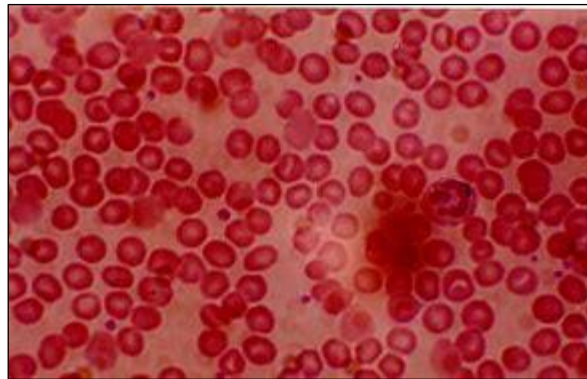
### Adipose cells:

adipose cell also called adipocyte or fat cell. These cells are the cells that primarily compose adipose tissue, specialized in storing energy as fat. There are two types of adipose cells; white adipose cells and brown adipose cells.



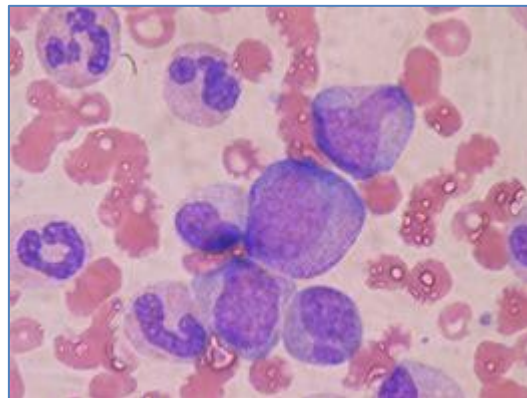
### **Human red blood cells (RBCs) (erythrocytes) :**

The mature human red blood cell is small, round and biconcave. They lack a cell nucleus and most organelles in order to accommodate maximum space for hemoglobin. Millions of RBC give the blood its characteristic color and carry oxygen from the lung to the tissues.



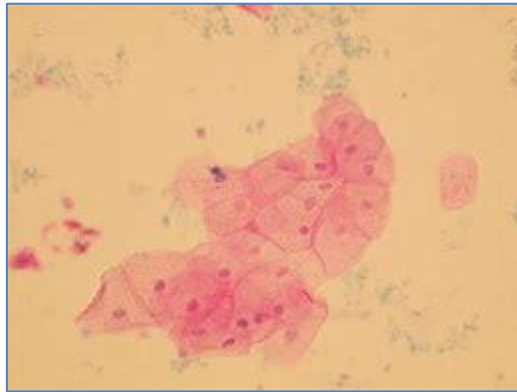
### **Human white blood cells (WBC) (leukocytes):**

white blood cells or leukocytes are cells of the immune system. Five different types of leukocytes exist, but they are all produced and derived in bone marrow. they consist of lymphocytes and monocytes with relatively clear cytoplasm, and three types of granulocyte; neutrophils, eosinophils and basophils whose cytoplasm filled with granules. WBCs unlike RBCs contain nuclei.



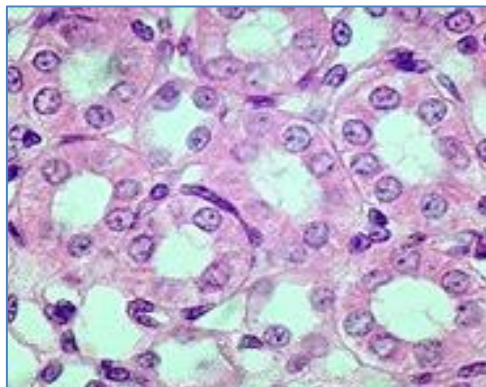
## **Squamous cells**

a squamous cell is a type of epithelial cell that is found in many locations of the body. These cells are flat found in mouth, lips, cervix, as well as in the middle layers of the skin. These cells may be composed one layer (simple squamous epithelium) or it may possess multiple layers (stratified squamous epithelium).



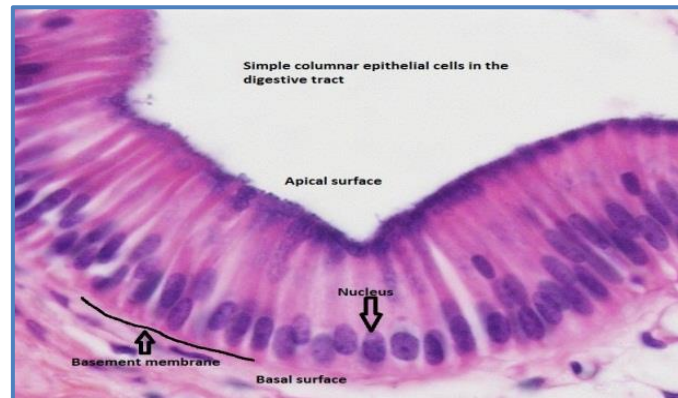
## **Cuboidal cells:**

cuboidal cells are epithelial cells with cube like shape with large, spherical and central nuclei. These cells are found on the surface of ovaries, the lining of nephrons, the walls of the renal tubules and parts of eye and thyroid. These cells provide protection.



### Columnar cells:

simple columnar epithelia cells are longer than they are wide. Characteristically, their nuclei are found at the base of the cell. The cells are connected by tight junctions and receive nutrients through the basement membrane. The main function of these cells is protection.



### Frog red blood cells

Numerous differences can be seen between frog RBCs and human RBCs. The most obvious is the oval shape of the frog erythrocytes rather than the biconcave discs of human blood. Moreover, the frog erythrocytes have a nucleus whilst human erythrocytes do not. There is less difference in size between the erythrocytes and leucocytes than in human blood. There are no platelets in frog blood.

